CRPL-F53

IONOSPHERIC DATA

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PREPARED BY CENTRAL RADIO PROPAGATION LABORATORY
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CONTENTS

NEW TERMINOLOGY

Beginning with data reported for January 1949, the symbols and terminology used in this report (CRPL-F series) will conform as far as practicable to those adopted at the Fifth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Stockholm, 1948.

The following excerpts are taken from Document No. 293 E, 29 July 1948, Standardization of Symbols and Presentation of Results of Ionospheric Soundings:

The C.C.I.R. . . . RECOMMENDS:

1. That use of the symbols detailed below be recognized in the interchange of ionospheric data:

a. General Symbols (See Appendix 1).

b. Symbols representing numerical values of characteristics most commonly observed or derived from ionospheric records (See Appendix 2).

c. Qualifying Symbols (See Appendix 3).

d. Descriptive Symbols (See Appendix 4). . . .

APPENDIX 1

GENERAL SYMBOLS

1.	f	frequency
2.	fo	ordinary-wave critical frequency
3.	fx	extraordinary-wave critical frequency
4.	fz	critical frequency corresponding to the lowest-frequency branch of triply-split h'f curve
5.	h'	virtual height (frequently used to denote minimum virtual height)
6.	hp	virtual height measured on ordinary-wave branch at a frequency equal to 0.834 times fo
7.	MUF	maximum usable frequency
8.	d-MUF	maximum usable frequency for a path of some specified standard length d

9.	FOT	optimum traffic frequency (formerly optimum working frequency)
10.	LUF	lowest useful high frequency
11.	Md	maximum usable frequency factor for a path of some specified standard length d
12.	h'f	an observation displaying the virtual height h' as a function of frequency f
13.	h't	an observation displaying the virtual height h' as a function of time t for a specified fixed frequency

NOTE: It is now very nearly universal practice to specify quantities in the above list representing frequencies in megacycles per second, and to specify quantities representing height or distance in kilometers. Exceptions should always be clearly indicated, as for example the use of miles in symbols 8 and 11.

In the table above the abbreviations MUF, FOT, and LUF should be left unaltered in sequence of letters when translated into various languages in order to preserve them as pronounceable words.

APPENDIX 2

SYMBOLS REPRESENTING NUMERICAL VALUES OF CHARACTERISTICS MOST COMMONLY OBSERVED OR DERIVED FROM IONOSPHERIC RECORDS

1.	foE	critical frequency for E-layer ordinary wave (See Remark 1)
2.	foF1	critical frequency for F1-layer ordinary wave
3.	foF2	critical frequency for F2-layer ordinary wave
4.	fxE	critical frequency for E-layer extraordinary wave
5.	fxF1	critical frequency for F1-layer extraordinary wave
6.	fxF2	critical frequency for F2-layer extraordinary wave
7.	fzF1	critical frequency for F1 layer corresponding to the lowest-frequency branch of an h'f curve showing triple splitting in the F1 layer
8.	fzF2	critical frequency for F2 layer corresponding to the lowest-frequency branch of an h'f curve showing triple splitting in the F2 layer

9.	fEs	highest frequency on which echoes of the sporadic type are observed from the E layer (See Remark 2)
10.	fbEs	the lowest frequency at which echoes from the F layer are observed when the sporadic echoes from the E layer are of the intense or blanketing type
11.	h'E	minimum virtual height of E layer on ordinary-wave branch
12.	h'F1	minimum virtual height of F1 layer on ordinary-wave branch
13.	h'F2	minimum virtual height of F2 layer on ordinary-wave branch
14.	h'Es	minimum virtual height of sporadic echoes from the E layer
15.	hpF1	virtual height of F1 layer measured on the ordinary-wave branch at a frequency equal to 0.834 times foF1
16.	hpF2	virtual height of F2 layer measured on the ordinary-wave branch at a frequency equal to 0.834 times foF2
17.	E-d-MUF	maximum usable frequency for E-layer transmission for path of some specified standard length d
18.	F1-d-MUF	maximum usable frequency for F1-layer transmission for path of some specified standard length d
19.	F2-d-MUF	maximum usable frequency for F2-layer transmission for path of some specified standard length d
20.	(Md)E	maximum usable frequency factor for E-layer transmission for a path of some specified standard length d
21.	(Md)F1	maximum usable frequency factor for F1-layer transmission for a path of some specified standard length d
22.	(Md)F2	maximum usable frequency factor for F2-layer transmission for a path of some specified standard length d

REMARK 1: In the event that clear stratification is evident within the regular E layer, and a second critical frequency is observed, it is increasingly common practice to refer to the upper critical frequencies as foE2 and fxE2, and the minimum virtual height as h'E2.

REMARK 2: Understanding of the processes which give rise to sporadic-E reflections is still largely lacking. There have been cases reported in which sufficient retardation, and also change in echo intensity, has been observed to suggest the possibility of using such symbols as foEs and fxEs. When this resolution is not possible, it is customary to regard fEs as equivalent to foEs.

NOTE: It is now very nearly universal practice to specify quantities in the above list representing frequencies in megacycles per second, and to specify quantities representing height or distance in kilometers. Exceptions should always be clearly indicated, as for example the use of miles in symbols 17 to 22, inclusive.

It should be remarked that all symbols of the above list are to be typeset as typewritten, on a straight line, i.e., superscripts and subscripts are no longer to be used.

APPENDIX 3

QUALIFYING SYMBOLS

1. ( ) Individual observed values thus enclosed are considered doubtful. The reason for doubt should be specified by an appropriate descriptive symbol (See Appendix 4) or by a footnote.

2. [ ] Individual numerical values thus enclosed represent interpolations rather than observations. The reason for the interpolation should be specified by an appropriate descriptive symbol (See Appendix 4) or by a footnote.

NOTE CONCERNING INTERPOLATION:

In hourly tabulations of ionospheric characteristics it is considered desirable to replace a single missing value by an interpolated value. If, however, two or more consecutive hourly values are missing, interpolation should not be performed. The matter of interpolation is given further attention in Appendix 4.

APPENDIX 4

DESCRIPTIVE SYMBOLS

	Symbol	Notes on Use Which Refer	Definition
1.	A or a	2, 5, 6	characteristic not measurable because of blanketing by Es
2.	B or b	2, 5, 6	characteristic not measurable because of absorption either partial or complete
3.	C or c	1, 5	characteristic not observed because of equipment failure
4.	D or d	1, 4	characteristic at a frequency higher than upper frequency limit of equipment
5.	E or e	1, 4	characteristic at a frequency lower than lower frequency limit of equipment
6.	F or f	2, 5, 6	spread echoes present
7.	G or g	1, 4	(a) F2-layer critical frequency equal to or less than F1-layer critical frequency (b) no sporadic-E echoes observed
8.	H or h	3, 6	stratification observed within the layer
9.	J or j	3, 6	ordinary-wave characteristic deduced from measured extraordinary-wave characteristic
10.	K or k	3, 6	ionosphere storm in progress
11.	L or l	1, 5, 6	(a) critical frequency, MUF, or MUF factor for F1 layer omitted because no definite or abrupt change in slope of the h'f curve is observed either for the first reflection or for any of the multiples (b) minimum virtual height for F2 layer omitted because the F2-layer trace is continuous with the F1-layer trace, but without a point of zero slope

	Symbol	Notes on Use Which Refer	Definition
12.	M or m	1, 5	characteristic not observed because of some failure or omission on the part of the operator, rather than owing to any mechanical or electrical fault in the equipment or its power supply
13.	N or n	1, 5, 6	unable to make logical interpretation
14.	P or p	3, 6	trace extrapolated to critical frequency
15.	Q or q	1	distinct layer not present
16.	R or r	2, 5, 6	curve becomes incoherent near F2-layer critical frequency
17.	S or s	2, 5, 6	characteristic obscured by interference
18.	T or t	1, 5	loss or destruction of successful observations
19.	V or v	3, 6	trace forked near critical frequency
20.	W or w	1, 4	characteristic at a height greater than the upper height limit of equipment
21.	Y or y	3	Es trace intermittent in frequency range
22.	Z or z	3	three components of h'f curve of layer observed

GENERAL NOTES:

For nearly all purposes enough symbols have been provided to make it unnecessary to leave any blank spaces in monthly tabulations of hourly values. In the event that no symbol should be found to be entirely satisfactory a suitable footnote should be given. Blank spaces in the tabulation sheets will be taken to indicate that no observation was scheduled at the given hour.

It should be noted that many occasions will arise when more than one letter symbol is appropriate to describe circumstances of a particular observation. There should be no hesitation at recording several descriptive symbols, if appropriate, in elucidating the circumstances surrounding a particular observation. In some cases it will be found that one letter symbol can well be used to describe or qualify another.

In use of the above letter symbols, capital or block letters are to be preferred on the grounds that small script letters are sometimes illegible or misleading, because of their resemblance to numbers. The capital or block letters are preferable in script.

NOTES ON THE USE OF THE DESCRIPTIVE SYMBOLS:

1. The following descriptive symbols are used only in place of an observed numerical value:

   C, D, E, G, L, M, N, Q, T, and W

2. The following descriptive symbols may be used either in place of, or to qualify, an observed numerical value:

   A, B, F, R, and S

3. The following descriptive symbols may be used only to qualify an observed numerical value:

   H, J, K, P, V, Y, and Z.

4. Certain of the descriptive symbols when used in place of an observed numerical value, have the same force as an actual number when medians are taken, and should therefore be included in the median count in the manner made appropriate by their definitions. It should be noted, however, that if half or more of the observations are represented by these symbols, the median can only be indicated as greater than or less than the numerical value of the limitation represented. These symbols are:

   D, E, G, and W

5. When an observed numerical value has been replaced with certain of the descriptive symbols, it is frequently permissible to enter an interpolated value (See discussion of interpolation practice in Appendix 3). Such symbols, which then qualify the interpolated value, are:

   A, B, C, F, L, M, N, R, S, and T

6. When an observed numerical value is indicated as doubtful by the use of parentheses, the reason for doubt should always be indicated. The following descriptive symbols are often used to provide the explanation:

   A, B, F, H, J, K, P, R, S, and V

APPENDIX 5

MEDIAN VALUES, MEDIAN COUNTS, CONVENTIONS FOR DETERMINATION OF MEDIAN VALUES OF IONOSPHERIC CHARACTERISTICS

1. Definitions

   a. For a set consisting of an odd number of numerical values, the median value is the middle value of the set when its members are arranged in order of size.

   b. For a set consisting of an even number of numerical values, the median value is the arithmetic mean of the two middle values of the set when its members are arranged in order of size.

   c. For a set of numerical values, the median count is the number of numerical values in the set.

2. Conventions

   a. Rounding off--A median value, found according to "b" above, should contain no more significant places than an individual member of the set. Therefore, rounding off, for example to the nearest even digit, in the last place may at times be necessary.

   b. Use of Certain Descriptive Letter Symbols as Numerical Values for Purposes of Finding a Median Value--This matter is discussed in Appendix 4 under note 4 on the usage of the descriptive symbols. The letter symbols which have the force of numerical values are D, E, G, and W.

   c. Doubtful Monthly Median Values--Such values for a characteristic observed at a specified hour are indicated, as in the case of doubtful single values, by inclusion in parentheses. See Appendix 3. The following conventions may be used to determine whether or not a median value is doubtful:

i. If only four values or less are available, the data are considered insufficient and no median value is determined. The monthly summary should in such cases show a dash.

ii. For the F2 layer, if only five to nine values are available, the median is considered doubtful. The E and F1 layers are so regular in their characteristics that, as long as there are at least five values, the median is not considered doubtful.

iii. For all layers, if more than half of the numerical values used to compute the median are doubtful (either doubtful or interpolated), the median is considered doubtful.

MONTHLY AVERAGE AND MEDIAN VALUES OF WORLD-WIDE IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 28 and figures 1 to 56 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL predictions of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

Australian Council for Scientific and Industrial Research,
Radio Research Board:
Brisbane, Australia
Canberra, Australia

British Department of Scientific and Industrial Research,
Radio Research Board:
Falkland Is.
Fraserburgh, Scotland
Lindau/Harz, Germany
Slough, England

South African Council for Scientific and Industrial Research:
Capetown, Union of S. Africa
Johannesburg, Union of S. Africa

Japanese Physical Institute for Radio Waves (under supervision of Supreme Commander, Allied Powers):
Shibata, Japan

National Bureau of Standards (Central Radio Propagation Laboratory):
Baton Rouge, Louisiana (Louisiana State University)
Boston, Massachusetts (Harvard University)
Guam I.
Huancayo, Peru (Instituto Geofisico de Huancayo)
Maui, Hawaii
Palmyra I.
San Francisco, California (Stanford University)
San Juan, Puerto Rico (University of Puerto Rico)
Trinidad, British West Indies
Washington, D. C.
White Sands, New Mexico
Wuchang, China (National Wuhan University)

French Ministry of Naval Armaments (Section for Scientific Research):
Fribourg, Germany

National Laboratory of Radio-Electricity (French Ionospheric Bureau):
Bagneux, France

The tables and graphs of ionospheric data are correct for the values reported to the CRPL, but, because of variations in practice in the interpretation of records and scaling and manner of reporting of values, may at times give an erroneous conception of typical ionospheric characteristics at the station. Some of the errors are due to:

a. Differences in scaling records when spread echoes are present.

b. Omission of values when foF2 is less than or equal to foF1, leading to erroneously high values of monthly averages or median values.

c. Omission of values when critical frequencies are less than the lower frequency limit of the recorder, also leading to erroneously high values of monthly average or median values.

These effects were discussed on pages 6 and 7 of the previous F-series report IRPL-F5.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.

b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.

c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.

The following predicted smoothed 12-month running-average Zürich sunspot numbers were used in constructing the contour charts:

Month	Predicted Sunspot No.			
	1948	1947	1946	1945
December	114	126	85	38
November	115	124	83	36
October	116	119	81	23
September	117	121	79	22
August	123	122	77	20
July	125	116	73	
June	129	112	67	
May	130	109	67	
April	133	107	62	
March	133	105	51	
February	133	90	46	
January	130	88	42	

IONOSPHERIC DATA FOR EVERY DAY AND HOUR AT WASHINGTON, D. C.

The data given in tables 29 to 40 follow the scaling practices given in the report IRPL-C61, "Report of International Radio Propagation Conference," pages 36 to 39, and the median values are determined by the conventions as given in previous issues of the F series.

IONOSPHERE DISTURBANCES

Table 41 presents ionosphere character figures for Washington, D. C., during December 1948, as determined by the criteria presented in the report IRPL-R5, "Criteria for Ionospheric Storminess," together with Cheltenham, Maryland, geomagnetic K-figures, which are usually covariant with them.

Table 42 lists for the stations whose locations are given the sudden ionosphere disturbances observed on the continuous field intensity recordings made at the Sterling Radio Propagation Laboratory during December 1948.

Table 43 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Point Reyes, California, receiving station of RCA Communications, Inc., for December 22, 23, 24, and 26, 1948.

Table 44 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Brentwood and Somerton, England, receiving stations of Cable and Wireless, Ltd., for December 9 and 11, 1948.

Table 45 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Platanos, Argentina, receiving station of the International Telephone and Telegraph Corporation for October 11 and 21, and November 13, 18, and 22, 1948.

Table 46 gives provisional radio propagation quality figures for the North Atlantic and North Pacific areas, for 01 to 12 and 13 to 24 GCT, November 1948, compared with the CRPL daily radio disturbance warnings, which are primarily for the North Atlantic paths, the CRPL weekly radio propagation forecasts of probable disturbed periods, and the half-day Cheltenham, Maryland, geomagnetic K-figures.

The radio propagation quality figures are prepared from radio traffic and ionospheric data reported to the CRPL, in a manner basically the same as that described in IRPL-R31, "North Atlantic Radio Propagation Disturbances, October 1943 through October 1945," issued February 1, 1946. The scale conversions for each report are revised for use with the data

beginning January 1948, and statistical weighting replaces what was, in effect, subjective weighting. Separate master distribution curves of the type described in IRPL-R31 were derived for the part of 1946 covered by each report; data received only since 1946 are compared with the master curve for the period of the available data. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. Each report is given a statistical weight which is the reciprocal of the departure from linearity. The half-daily radio propagation quality figure, beginning January 1948, is the weighted mean of the reports received for that period.

These radio propagation quality figures give a consensus of opinion of actual radio propagation conditions as reported by the half day over the two general areas. It should be borne in mind, however, that though the quality may be disturbed according to the CRPL scale, the cause of the disturbance is not necessarily known. There are many variables that must be considered. In addition to ionospheric storminess itself as the cause, conditions may be reported as disturbed because of seasonal characteristics, such as are particularly evident in the pronounced day and night contrast over North Pacific paths during the winter months, or because of improper frequency usage for the path and time of day in question. Insofar as possible, frequency usage is included in rating the reports. Where the actual frequency is not shown in the report to the CRPL, it has been assumed that the report is made on the use of optimum working frequencies for the path and time of day in question. Since there is a possibility that all the disturbance shown by the quality figures is not due to ionospheric storminess alone, care should be taken in using the quality figures in research correlations with solar, auroral, geomagnetic, or other data. Nevertheless, these quality figures do reflect a consensus of opinion of actual radio propagation conditions as found on any one half day in either of the two general areas.

SOLAR CORONAL INTENSITIES OBSERVED AT CLIMAX, COLORADO

In tables 47a and 47b are listed the intensities of green (5303A) line of the emission spectrum of the solar corona as observed November 30 and during December 1948 by the High Altitude Observatory of Harvard University and the University of Colorado at Climax, Colorado, for east and west limbs, respectively, at 5° intervals of position angle north and south of the solar equator at the limb computed to the nearest 5°. A correction, P, as listed, has been applied to the position angles of the actual observations which were on astronomical coordinates. The time of observation is given to the nearest tenth of a day, GCT. The tables of coronal observations in CRPL-F29 to F41 listed the data on <u>astronomical</u> coordinates; the present format on solar <u>rotation</u> coordinates is in conformity with the tables of CRPL-1-4, "Observations of the Solar Corona at Climax, 1944-46."

Tables 48a and 48b give similarly the intensities of the first red (6374A) coronal line; tables 49a and 49b list the intensities of the second red (6704A) coronal line. The following symbols are used in tables 47, 48, and 49: a, observation of low weight; -, corona not visible; and x, position angle not included in plate estimates.

Table 50 gives details of the Climax observations from July 1948 through December 1948. The first column lists the Greenwich date of observation; the next six columns give the threshold or lowest observable intensity of 5303A for each spectrum plate centered at astronomical position angles 45°, 90°, 135°, 225°, 270°, and 315°, respectively; the last two columns indicate the observer and the person responsible for the intensity estimates of the observation. This table is a continuation of table 1 of CRPL-1-4 and appears at intervals of six months.

AMERICAN AND ZÜRICH PROVISIONAL RELATIVE SUNSPOT NUMBERS

Table 51 presents the daily American relative sunspot number, R_A, computed from observations communicated to CRPL by observers in America and abroad. Beginning with the observations for January 1948, a new method of reduction of observations is employed such that each observer is assigned a scale-determining "observatory coefficient," ultimately referred to Zürich observations in a standard period, December 1944 to September 1945, and a statistical weight, the reciprocal of the variance of the observatory coefficient. The daily numbers listed in the table are the weighted means of <u>all</u> observations received for each day. Details of the procedure will be published shortly. The American relative sunspot number computed in this way is designated R_A. It is noted that a number of observatories abroad, including the Zürich observatory, are included in R_A. The scale of R_A was referred specifically to that of the Zürich relative sunspot numbers in the standard comparison period; since that time, R_A is influenced by the Zürich observations only in that Zürich proves to be a consistent observer and receives a high statistical weight. In addition, this table lists the daily provisional Zürich sunspot numbers, R_Z.

TABLES AND GRAPHS
OF
IONOSPHERIC DATA

TABLES OF IONOSPHERIC DATA

Table 1

Washington, D. C. (39.0°N, 77.5°W) December 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	4.1						2.9
01	270	3.8						2.9
02	260	3.9						2.9
03	250	3.9						3.0
04	250	3.9						2.9
05	250	3.7						3.0
06	250	3.5						3.0
07	240	4.5						3.1
08	220	7.7			120	2.2	2.1	3.5
09	210	9.5			100	(2.7)		3.4
10	220	10.3	210		100	3.1		3.4
11	230	11.3	(210)		100	3.3		3.2
12	230	11.7	210		100	3.4		3.2
13	230	11.8	205		100	3.3		3.1
14	220	11.5	210		100	3.1		3.1
15	230	(11.4)			100	(2.7)	2.3	(3.1)
16	220	(11.0)			100	2.2	1.9	3.2
17	200	(10.0)				1.8	2.0	(3.3)
18	210	8.4					1.8	3.2
19	210	7.2						3.2
20	210	5.8						3.2
21	230	4.8						3.0
22	250	4.3						3.0
23	250	(4.3)						(3.0)

Time: 75.0°W.
Sweep: 1.0 Mc to 25.0 Mc in 15 seconds.

Table 2

Boston, Massachusetts (42.4°N, 71.2°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	262	5.4						2.7
01	260	5.2						2.6
02	260	5.0					1.2	2.6
03	255	4.6					1.2	2.7
04	250	4.1					1.2	2.7
05	250	4.2						2.7
06	255	4.2						2.7
07	242	7.6						3.0
08	230	9.6						3.2
09	230	10.2						3.1
10	230	10.6						3.1
11	238	11.0						3.2
12	235	11.4						3.1
13	242	11.2						3.1
14	242	11.3						3.1
15	235	11.0						3.1
16	235	10.8						3.0
17	230	10.0						3.1
18	230	9.7						2.9
19	240	8.2						2.9
20	245	7.4						2.8
21	250	6.7						2.7
22	255	5.8						2.7
23	258	5.7						2.7

Time: 75.0°W.
Sweep: 0.8 Mc to 14.0 Mc in 1 minute.

Table 3

San Francisco, California (37.4°N, 122.2°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	3.6					2.6	2.5
01	290	3.6					2.6	2.5
02	300	3.6					2.7	2.5
03	300	3.6					2.5	2.6
04	280	3.6					2.5	2.6
05	300	3.5					2.6	2.5
06	290	3.4						2.6
07	240	6.5					2.5	2.9
08	220	9.8			120	2.6		3.1
09	220	10.8			120	2.9		3.0
10	220	12.1			120	3.3		2.8
11	220	13.2			120	3.4		2.9
12	220	13.3			120	3.5		2.8
13	230	13.1			120	3.4		2.8
14	240	13.0			120	3.4		2.8
15	240	13.0			120	3.1		2.8
16	220	12.6			120	2.4		2.8
17	220	11.2					2.6	2.8
18	220	9.1					2.5	2.9
19	220	7.2					2.6	2.9
20	225	5.5					2.7	2.9
21	240	4.1					2.8	2.8
22	280	3.6					2.5	2.6
23	300	3.4					2.4	2.6

Time: 120.0°W.
Sweep: 1.3 Mc to 18.5 Mc in 4 minutes 30 seconds.

Table 4

White Sands, New Mexico (32.3°N, 106.5°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	295	3.8					3.3	2.6
01	280	3.8					2.8	2.6
02	280	3.7					2.6	2.6
03	295	3.8					3.0	2.7
04	280	3.6					2.4	2.6
05	300	3.5					2.4	2.5
06	300	4.0					2.6	2.6
07	245	(7.0)			120	(2.0)	3.0	(3.0)
08	240	10.4			120	2.6	3.6	3.2
09	240	12.0			120	3.0	4.0	3.1
10	220	12.1			110	3.3	4.2	3.1
11	230	12.8			110	3.5	4.4	3.0
12	220	12.8			110	3.5	4.4	2.9
13	230	12.7			110	3.5	4.3	2.9
14	240	12.5			110	3.4	4.1	2.9
15	240	12.0			110	3.0	4.2	2.9
16	240	11.8			120	2.5	3.7	2.9
17	220	11.4				(1.8)	3.3	3.0
18	220	9.4					3.2	3.0
19	220	7.6					3.2	3.0
20	230	5.8					3.2	3.0
21	250	4.6					3.2	3.0
22	280	4.1					3.0	2.8
23	300	3.9					3.6	2.6

Time: 105.0°W.
Sweep: 0.79 Mc to 14.0 Mc in 2 minutes.

Table 5

Wucheng, China (30.6°N, 114.4°E) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	260	6.0						2.8
01	255	5.5						2.9
02	245	5.0						3.0
03	245	4.9						3.0
04	230	4.3						3.2
05	255	3.2						2.9
06	280	3.2						2.9
07	235	7.5			145	1.8		3.2
08	220	10.0			100	2.5		3.4
09	220	11.2			100	3.0		3.3
10	225	12.2	220		100	3.3		3.2
11	228	13.4	210	4.6	100	3.5		3.1
12	240	13.6	218	6.2	100	3.6		3.0
13	240	14.5	210	5.6	100	3.5		3.0
14	230	14.7	218	5.4	100	3.4		3.0
15	230	14.6	228	(4.5)	100	3.1		3.0
16	225	14.0	230	5.2	100	2.7		3.0
17	225	13.5			100	2.1		3.0
18	210	12.2			100		2.6	3.1
19	220	10.9					2.7	3.0
20	225	10.5					2.6	3.0
21	220	9.1					2.4	3.1
22	222	7.8					1.8	3.0
23	242	6.5						2.9

Time: 120.0°E.
Sweep: 1.2 Mc to 19.0 Mc in 15 minutes, automatic operation.

Table 6

Baton Rouge, Louisiana (30.5°N, 91.2°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	4.2						3.0
01	290	4.0						2.9
02	290	4.0						3.0
03	290	3.8						2.9
04	290	3.7						2.9
05	310	3.7						2.9
06	290	4.1						3.0
07	250	8.2						3.3
08	270	10.4	230		120	2.7		3.2
09	270	11.6	230		120	3.2		3.2
10	280	12.0	220		120	3.4		3.1
11	280	12.3	220		120	(3.5)		3.1
12	280	12.5	220		120	3.6		3.0
13	290	12.5	230		120	3.6		2.9
14	290	12.5	230		120	3.5		3.0
15	280	12.0	230		120	3.2		3.0
16	280	11.6	230		120	2.6		3.0
17	240	11.0						3.0
18	220	9.4						3.1
19	230	7.8						3.1
20	230	6.6						3.1
21	240	5.4						3.1
22	270	5.0						3.0
23	280	4.4						3.0

Time: 90.0°W.
Sweep: 2.12 Mc to 16.3 Mc in 8 minutes 30 seconds, automatic operation.

Table 7

Maui, Hawaii (20.8°N, 156.5°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	225	6.1						3.0
01	220	5.3						3.1
02	220	4.5						3.1
03	235	3.4						2.9
04	320	3.0						2.6
05	345	3.0						2.6
06	340	3.2						2.6
07	250	7.4				E		3.1
08	240	11.4			105	2.8		3.2
09	250	13.4	225		100	3.3		3.1
10	250	14.0	230		110	3.4		3.1
11	260	15.1	220		110	3.7		3.0
12	280	15.6	210		100	3.7		(2.9)
13	280	16.8	220		100	3.8		2.9
14	300	16.8	230		100	3.6	4.2	(3.0)
15	250	16.6	230		100	3.2	4.0	3.0
16	240	15.8			100	3.0		3.0
17	230	14.8			140	2.5		3.1
18	210	13.0				E		3.1
19	200	11.3						(3.1)
20	220	11.2						(3.0)
21	210	10.2						(3.2)
22	220	9.1						(3.1)
23	220	8.0						3.1

Time: 150.0°W.
Sweep: 2.2 Mc to 16.0 Mc in 1 minute; above 16.0 Mc, manual operation.

Table 8

San Juan, Puerto Rico (18.4°N, 66.1°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		6.6						2.9
01		5.9						2.9
02		5.2						2.9
03		4.1						2.7
04		4.0						2.6
05		4.2						2.7
06		5.1						2.8
07	250	8.5		3.1				3.0
08	250	11.4		3.7		E		3.0
09	260	13.0				3.3		3.0
10	260	13.0				3.6		3.0
11	275	13.0				3.9		2.9
12	280	12.8				4.0		2.8
13	300	12.4				3.9		2.7
14	300	12.3		5.0		(3.7)		2.7
15	290	12.1				3.5		2.7
16	280	11.5				3.2		2.8
17	270	11.0						2.8
18	270	10.0						2.8
19	270	9.2						2.8
20		9.0						2.8
21		8.6						2.8
22		(8.2)						2.8
23		7.4						2.9

Time: 60.0°W.
Sweep: 2.8 Mc to 13.0 Mc in 9 minutes; supplemented by manual operation.

Table 9

Guam I. (13.6°N, 144.9°E) November 1948*

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	230	11.5					2.5	3.1
01	230	10.5					2.8	3.2
02	230	10.0					2.2	3.2
03	220	8.0					2.5	3.2
04	230	6.3					2.2	3.0
05	240	5.1					2.6	3.1
06	250	5.5					2.5	2.9
07	250	9.6					3.6	3.1
08	240	12.9					5.0	3.0
09	230	14.7					5.0	2.9
10	220	14.4					5.8	2.6
11	210	14.0					5.5	2.4
12	210	13.8					5.8	2.3
13	215	13.6					6.0	2.3
14	220	14.2					6.6	2.4
15	230	14.4					5.8	2.4
16	240	14.6					6.1	2.5
17	250	14.7					6.0	2.5
18	270	14.7					5.0	2.4
19	320	14.3					4.8	2.3
20	300	(14.4)					3.0	(2.4)
21	260	14.2					3.4	2.6
22	240	13.2					4.6	2.8
23	230	12.0					2.6	(2.9)

Time: 150.0°E.
Sweep: 1.25 Mc to 19.0 Mc in 12 minutes, manual operation.
*Data for November 1 through 20, only.

Table 10

Trinidad, Brit. West Indies (10.6°N, 61.2°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	240	7.2						3.2
01	230	6.6						3.2
02	250	4.2						3.2
03	260	3.2						2.9
04	310	3.2						2.7
05	290	3.9						2.8
06	280	6.0					2.2	3.0
07	250	9.8			120	2.5	3.0	3.2
08	240	12.4			120	3.1	3.8	3.2
09	250	13.8	230	4.7	120	3.5	4.1	3.1
10	250	13.9	220	4.9	120	3.8	4.4	3.1
11	260	13.5	220	5.0	120	3.9	4.4	3.0
12	265	13.2	220	5.1	120	3.9	4.6	2.9
13	260	12.6	220	5.1	120	3.8	4.6	2.8
14	260	12.6	220	4.8	120	3.6	4.4	2.8
15	250	12.2	220	4.7	120	3.5	4.3	2.8
16	270	12.0	240	4.8	120	3.1	4.2	2.8
17	250	11.8			120	2.5	3.8	2.8
18	255	11.6					3.2	2.9
19	250	11.2					3.0	2.9
20	250	10.4					2.5	2.9
21	250	10.0					2.3	2.9
22	250	9.5						3.0
23	250	8.0						3.0

Time: 60.0°W.
Sweep: 1.2 Mc to 16.0 Mc, manual operation.

Table 11

Palmyra I. (5.9°N, 162.1°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	10.9					4.4	3.0
01	250	(9.2)					4.2	2.9
02	260	(8.2)					3.9	2.9
03	255	7.8					3.8	2.9
04	245	(7.3)					3.0	3.0
05	250	6.8					3.0	2.9
06	280	7.1					2.6	2.9
07	270	10.2			130	2.5	3.8	2.8
08	250	12.6			120	3.2	4.1	2.7
09	270	13.7	240		120	3.7	4.3	2.6
10	280	12.6	230		120	3.6	4.6	2.4
11	270	12.0	220		120	4.0	4.3	2.3
12	270	12.1	220		120	4.1	4.3	2.3
13	260	12.5	200		120	4.0	4.3	2.3
14	260	13.1	200	4.4	120	3.8	4.4	2.4
15	250	13.7	200	3.6	120	3.6	4.3	2.4
16	250	14.3			120	3.2	4.3	2.6
17	270	14.6			130	2.7	4.3	2.5
18	290	14.5			155		3.8	2.6
19	320	14.3					3.7	2.5
20	300	14.0					3.6	2.6
21	280	13.8					3.8	2.6
22	270	13.6					4.6	2.6
23	260	12.2					4.3	3.0

Time: 157.5°W.
Sweep: 1.0 Mc to 13.0 Mc in 1 minute 36 seconds, automatic operation; 13.0 Mc to 18.0 Mc, manual operation.

Table 12

Huancayo, Peru (12.0°S, 75.3°W) November 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	285	(9.4)						(2.7)
01	270	(8.6)						(2.9)
02	240	8.2						3.1
03	235	7.2						3.1
04	230	6.0						3.1
05	240	5.6						3.0
06	250	9.0				2.4		3.0
07	240	11.8				3.1	5.6	2.9
08	230	12.9				3.6	10.6	2.6
09	230	13.4	220	5.4		3.9	10.8	2.8
10	230	13.8	210	5.4		4.1	11.9	2.3
11	220	12.6	205	5.4			11.9	2.2
12	210	12.7	210	6.4			11.1	2.3
13	210	12.6	210	6.4		4.2	11.8	2.3
14	210	12.7				4.0	10.7	2.2
15	220	12.7				3.6	10.8	2.2
16	240	12.6				3.2	10.7	2.2
17	260	12.2				2.6	5.8	2.1
18	300	11.9				1.5		2.2
19	370	11.2						2.1
20	405	10.0						2.1
21	395	9.8						2.2
22	380	10.0						(2.4)
23	330	9.9						(2.5)

Time: 75.0°W.
Sweep: 16.0 Mc to 0.6 Mc in 15 minutes, automatic operation.

Table 13

Lindau/Harz, Germany (51.6°N, 10.1°E) October 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	300	4.4					3.0	
01	300	4.3					3.2	
02	300	4.2					3.5	
03	300	3.8					3.4	
04	300	3.2					3.4	
05	300	3.2					3.5	
06	280	3.6					3.4	
07	230	5.5					3.8	
08	210	7.2			105	2.4	3.6	
09	210	8.5			105	2.8	3.8	
10	205	9.8			100	3.0	3.9	
11	200	10.5			100	3.1	3.8	
12	205	11.1			100	3.2	3.8	
13	205	10.8			100	3.2	3.8	
14	210	10.7			100	3.0	3.7	
15	210	11.3			100	2.8	3.4	
16	210	10.4			105	2.4	3.4	
17	210	10.3					3.5	
18	220	8.9					3.3	
19	210	7.9					3.3	
20	210	5.8					3.0	
21	250	5.4					3.1	
22	295	5.1					3.0	
23	300	4.4					3.0	

Time: 15.0°E.
Sweep: 1.0 Mc to 16.0 Mc in 12 minutes.

Table 14

Johannesburg, Union of S. Africa (26.2°S, 28.0°E) October 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	(270)	6.3					1.6	2.8
01	(260)	5.9						2.8
02	(250)	5.3						2.8
03	(265)	4.9						2.8
04	(270)	4.7						2.8
05	(270)	4.6						2.8
06	240	7.3			110	2.1		3.1
07	240	9.3	230		110	2.9		3.1
08	250	10.6	220		110	3.3		3.0
09	260	11.2	220	(4.9)	100	3.6		2.9
10	280	11.6	210	5.0	110	3.9		2.8
11	290	11.9	210	5.2	100	(4.0)		2.7
12	295	12.6	210	5.2	110	(4.0)		2.7
13	310	12.8	210	5.4	110	(4.0)		2.7
14	310	12.4	220	6.0	110	3.9	4.1	2.7
15	310	12.2	220		110	3.6	3.9	2.7
16	285	12.0	240		110	3.3	3.7	2.7
17	260	12.1	250		110	2.7	3.3	2.8
18	240	11.8				2.0	2.0	2.9
19	230	10.9					1.9	2.9
20	230	9.9						2.9
21	240	8.3						2.9
22	260	7.1					1.5	2.8
23	260	6.7					1.4	2.8

Time: 30.0°E.
Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 15

Capetown, Union of S. Africa (34.2°S, 18.3°E) October 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	(275)	5.1						2.8
01	(290)	4.9						2.7
02	(295)	5.0						2.7
03	(280)	4.7						2.8
04	(280)	4.6						2.7
05	(280)	4.2						2.7
06	270	5.4				1.8		2.9
07	240	7.8			120	2.5		3.2
08	250	9.4	240		110	3.0		3.0
09	260	10.2	230		110	3.3		2.9
10	(270)	11.1	220	4.9	110	(3.5)		2.8
11	290	11.6		5.6	110			(2.8)
12	300	12.2		5.9	110			2.7
13	310	12.3		5.6	110			2.7
14	310	12.6		5.8	110			2.7
15	310	12.5		5.8	110			2.7
16	300	12.3	240		110	3.5		2.8
17	270	12.2	240		110	3.0		2.8
18	250	12.0	240		120	2.4	2.6	2.9
19	240	11.3				1.8	1.7	(2.9)
20	230	9.7						3.0
21	230	7.9					1.5	2.9
22	(250)	6.6					1.4	2.9
23	(250)	5.6						2.8

Time: 30.0°E.
Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 16

Brisbane, Australia (27.5°S, 153.0°E) September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	245	6.9						2.9
01	245	6.6						2.8
02	240	6.4						2.8
03	250	5.6						2.7
04	280	5.7						2.7
05	280	5.6						2.7
06	250	7.6			150	2.2		3.1
07	240	9.6			100	2.8		3.2
08	230	10.6			100	3.3		3.2
09	250	11.4	220		100	3.5		3.2
10	250	11.7	215	5.0	100	3.8		3.1
11	260	11.4	210	6.0	100	3.8		3.0
12	260	11.2	210	5.0	100	3.8		2.8
13	260	11.1	210	5.0	110	3.8		2.8
14	250	10.6	210	5.0	110	3.7		2.8
15	250	10.4	210		110	3.5		2.8
16	240	10.0			110	3.0		2.9
17	250	9.6			115	2.4		3.0
18	240	9.2						3.0
19	250	8.8						2.9
20	250	8.6						2.9
21	250	8.3						2.9
22	250	7.9						2.9
23	250	7.5						2.9

Time: 150.0°E.
Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 17

Canberra, Australia (35.3°S, 149.0°E) September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	6.2						2.7
01	255	6.7					1.9	2.6
02	250	5.6					2.2	2.7
03	250	5.2						2.7
04	260	4.9						2.6
05	280	4.7						2.6
06	260	5.1			120	1.8		2.9
07	240	7.2			100	2.5	3.1	3.1
08	230	9.0			100	3.0	3.2	3.1
09	220	10.3			100	3.4		3.0
10	218	10.6	205	4.8	100	3.6		3.0
11	250	10.8	200	4.9	100	3.7		2.9
12	260	11.0	200	5.0	100	3.7		2.9
13	250	10.8	200	4.6	100	3.7		2.8
14	220	10.4	200	4.6	100	3.6		2.8
15	220	10.2	200	4.2	100	3.4		2.8
16	220	9.8			100	3.0		2.9
17	240	9.4			105	2.4	2.8	2.9
18	240	8.8				1.7		3.0
19	240	8.4						2.8
20	250	7.8						2.8
21	250	7.5						2.7
22	250	7.0						2.8
23	255	6.8						2.7

Time: 150.0°E.
Sweep: 1.0 Mc to 16.0 Mc in 1 minute 55 seconds.

Table 18*

Fraserburgh, Scotland (57.6°N, 2.1°W) August 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	330	(5.4)						
01	345	5.0						
02	355	4.4						
03	340	4.3						2.8
04	320	4.4	350#	2.6#				2.6
05	295	5.1	280	3.5				2.9
06	280	6.0	265	4.0	125	2.6		2.8
07	270	7.0	245	4.6	125	2.9	3.3	2.7
08	310	(7.0)	240	4.9	120	3.2	3.4	2.9
09	305	7.2	230	5.2	115	3.4	3.7	2.6
10	355	7.0	235	5.4	120	3.6	4.3	2.8
11	350	(7.2)	230	5.5	120	3.9	3.8	2.6
12	360	7.0	230	5.5	115	3.9		2.7
13	380	7.1	225	5.5	120	3.8		2.6
14	355	7.0	235	5.6	115	3.8		2.8
15	340	7.2	235	5.5	115	3.6	3.6	2.7
16	315	7.4	240	5.1	115	3.4	3.8	2.7
17	270	7.8	240	4.7	120	3.1	3.7	2.9
18	270	7.8	160#	4.0#	120	2.7	4.1	2.9
19	260	7.9			125	2.4	2.6	2.9
20	260	(8.1)						
21	280	(7.2)						2.8
22	300	7.0						
23	315	(5.4)						2.2

Time: Local.
Sweep: 2.2 Mc to 16.0 Mc in 1 minute.
*Average values except f°F2 and fEs, which are median values.
#One or two observations only.

Table 19*

Slough, England (51.5°N, 0.6°W) August 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	307	6.2					2.8	2.5
01	311	5.8					3.0	2.5
02	316	5.4					3.1	2.5
03	305	5.0					3.4	2.6
04	302	4.7				1.5#	3.5	2.6
05	296	5.3	271	3.4	122	1.8	3.7	2.7
06	289	6.1	258	4.0	119	2.3	4.8	2.8
07	312	7.0	244	4.6	116	2.9	5.0	2.8
08	355	7.8	235	5.0	114	3.2	5.0	2.8
09	362	7.4	235	6.2	112	3.5	5.1	2.8
10	359	7.8	229	5.4	112	3.6	5.0	2.8
11	383	7.8	231	5.5	112	3.8	5.0	2.8
12	376	7.8	232	6.5	112	3.9	5.0	2.8
13	384	7.9	228	5.5	113	3.9	5.0	2.7
14	382	7.9	236	5.5	114	3.7	4.9	2.7
15	359	7.8	238	5.4	114	3.6	5.0	2.7
16	345	7.8	240	5.1	113	3.4	4.9	2.8
17	299	8.1	246	4.6	115	3.0	5.0	2.8
18	273	8.6	250	4.2	118	2.4	4.9	2.8
19	266	8.7	260#	4.0#	131	2.0	3.5	2.8
20	269	8.2					3.5	2.8
21	268	7.8					3.4	2.7
22	292	7.1					3.2	2.6
23	297	6.8					3.3	2.5

Time: Local.
Sweep: 0.5 Mc to 16.5 in 5 minutes.
*Average values except f°F2 and fEs, which are median values.
#One or two observations only.

Table 20

Shibata, Japan (37.9°N, 139.3°E) August 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	7.4					3.4	2.8
01	290	7.6					3.0	2.8
02	290	7.2					3.0	2.8
03	270	6.8					2.8	2.7
04	280	6.6	240				2.7	2.8
05	270	6.8	240			(1.6)	2.8	2.9
06	240	7.5	225	3.7	100	2.4	3.5	3.1
07	240	8.7	200	4.5	100	2.8	4.8	3.2
08	260	9.1	200	4.9	100	3.3	5.2	3.1
09	270	9.2	200	5.1	100	3.4	5.4	3.2
10	300	9.2	200	5.3	100	3.7	5.7	3.0
11	300	9.3	200	5.5	100	3.8	6.0	2.9
12	300	9.8	200	5.5	100	4.0	5.5	3.0
13	310	9.6	200	5.6	100	3.8	6.8	2.9
14	300	9.2	200	5.2	100	3.8	5.2	3.0
15	290	9.0	200	4.9	100	3.7	5.1	3.0
16	280	9.0	200	5.0	100	3.4	5.9	3.1
17	260	8.9	210		100	3.0	5.0	3.1
18	245	9.0	225			2.4	4.2	3.2
19	240	8.5				(1.7)	3.9	3.0
20	240	7.8					3.6	2.9
21	300	7.7					4.6	2.7
22	280	7.8					3.5	2.7
23	280	7.7					3.8	2.8

Time: 135.0°E.
Sweep: 1.0 Mc to 17.0 Mc in 16 minutes, manual operation.

Table 21*

Fraserburgh, Scotland (57.6°N, 2.1°W) July 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	291	(7.2)						2.5
01	295	(6.9)						2.5
02	290	6.6						2.5
03	297	6.2		3.3#				2.6
04	293	6.2	312#	3.4#				2.7
05	276	6.6	244	3.9	112	2.5		2.7
06	301	6.6	218	4.6	104	3.0	2.9	2.6
07	357	6.9	217	4.8	104	3.3	4.2	2.6
08	336	7.3	234	5.2	109	3.3	4.2	2.7
09	350	7.3	234	5.4	102	3.6	4.2	2.8
10	353	7.5	231	5.4	96	3.7	4.1	2.6
11	343	7.2	218	5.6	103	3.7	4.2	2.6
12	397	7.1	232	5.7	109	3.8	4.0	2.6
13	385	7.2	216	5.5	104	3.7		2.7
14	400	7.0	218	5.6	104	3.8		2.7
15	375	7.2	219	5.5	108	3.8		2.7
16	344	7.1	222	5.3	107	3.5	4.0	2.8
17	306	7.3	235	5.1	109	3.4	4.1	2.8
18	266	7.6	217	4.6	108	3.1	4.2	2.7
19	248	7.5			111	2.7	3.8	2.9
20	251	(7.6)			135#	2.3#	2.6	2.9
21	258	(7.6)						2.8
22	265	(7.6)						2.8
23	280	7.5						2.4

Time: Local.
Sweep: 2.2 Mc to 16.0 Mc in 1 minute.
*Average values except for f°F2 and fEs, which are median values.
#One or two observations only.

Table 22*

Slough, England (51.5°N, 0.6°W) July 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	294	7.4					2.6	2.5
01	294	6.8					2.6	2.5
02	296	6.5					2.6	2.5
03	300	6.1					2.6	2.5
04	295	6.1	295	3.3	118	1.7	3.6	2.6
05	301	6.4	256	3.9	119	2.2		2.7
06	334	6.9	241	4.5	117	2.7	4.4	2.7
07	353	7.4	235	4.9	110	3.2	5.0	2.7
08	372	7.6	226	5.3	109	3.4	5.4	2.7
09	369	7.8	234	5.5	109	3.7	6.3	2.7
10	373	7.8	228	5.6	109	3.8	6.4	2.7
11	404	7.7	230	5.7	109	3.9	6.1	2.6
12	401	7.6	234	5.7	110	3.9	6.2	2.6
13	406	7.8	228	5.7	110	4.0	4.9	2.6
14	394	7.6	229	5.7	109	3.9	5.0	2.6
15	385	7.5	233	5.6	110	3.7	4.9	2.7
16	369	7.6	236	5.4	110	3.5	4.8	2.7
17	344	7.6	238	5.0	112	3.2		2.7
18	298	8.0	250	4.5	116	2.8	3.7	2.8
19	269	7.8	256	3.9	120	2.2	3.8	2.8
20	266	7.8	225#		115#	1.9#	3.2	2.8
21	266	7.8					3.1	2.7
22	281	7.8					2.6	2.6
23	290	7.6					2.6	2.6

Time: Local.
Sweep: 0.5 Mc to 16.5 Mc in 5 minutes.
*Average values except for f°F2 and fEs, which are median values.
#One or two observations only.

Table 23*

Falkland Is. (51.7°S, 57.8°W) July 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	284	3.0						2.4
01	372	3.0						2.4
02	369	2.9						2.4
03	365	2.9						2.5
04	341	2.9						2.5
05	305	3.0						2.6
06	308	2.8						2.8
07	275	4.1						2.9
08	223	6.9			155#	2.4#		3.2
09	219	8.2			165#	2.6		3.4
10	222	9.4						3.3
11	222	10.2			133#	2.7#		3.3
12	222	9.8			125#	2.9#		3.3
13	223	8.9			125#	2.9#		3.3
14	225	8.2			147#	2.6#		3.4
15	228	7.8						3.2
16	221	6.1						3.2
17	241	4.8						3.1
18	251	4.4						3.0
19	262	3.6						2.9
20	289	2.9						2.8
21	315	2.8						2.6
22	361	2.9						2.4
23	392	3.0						2.4

Time: Local.
Sweep: 2.2 Mc to 16.0 Mc in 1 minute.
*Average values except f°F2, which are median values.
#One or two observations only.

Table 24

Fribourg, Germany (48.1°N, 7.8°E) June 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	310	(8.0)					2.9	2.5
01	310	7.7					2.7	2.5
02	310	7.5					2.6	2.5
03	315	7.3					2.4	2.5
04	312	7.2				E	2.7	(2.5)
05	(290)	(7.7)	270		120	2.3	3.6	(2.7)
06	320	(8.3)	250	4.6	110	2.7	4.2	(2.6)
07	330	(8.8)	248	(5.2)	110	3.2	5.0	(2.7)
08	365	9.0	240	5.5	102	3.4	5.6	2.6
09	370	9.0	230	5.6	105	3.6	5.6	2.6
10	375	(9.1)	240	5.6	100	3.7	5.8	2.6
11	390	(9.0)	230	6.0	100	3.8	5.6	(2.6)
12	390	8.9	235	5.8	102	3.8	5.9	2.6
13	390	8.7	225	5.8	100	3.7	5.3	(2.6)
14	402	8.5	230	5.7	108	3.7	5.8	2.5
15	390	8.4	240	5.6	110	3.5	4.5	(2.6)
16	385	8.2	240	5.4	110	3.4	4.6	2.6
17	360	(8.1)	250	5.2	110	3.2	4.4	(2.6)
18	320	(8.4)	260		110	2.7	4.9	2.6
19	300	8.4			120	2.2	5.8	(2.7)
20	280	(8.4)			120	E	4.0	(2.8)
21	280	(8.3)					3.4	(2.7)
22	300	(8.3)					3.6	(2.6)
23	300	(8.3)					3.4	(2.5)

Time: Local.
Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.

Table 25*

Falkland Is. (51.7°S, 57.8°W) June 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	392	3.1						2.3
01	376	3.1						2.4
02	381	3.1						2.4
03	377	3.1						2.4
04	355	3.0						2.4
05	326	3.0						2.6
06	276	3.0						2.8
07	270	3.9						2.7
08	226	6.8				2.4#		3.1
09	223	8.4			148	2.6		3.3
10	219	9.9			135	2.9		3.3
11	231	9.9			131	2.9		3.3
12	235	9.9			129	3.0		3.3
13	234	9.2			135	2.9#		3.2
14	233	8.8			144	2.7		3.3
15	227	7.8			160#	2.6#		3.3
16	222	6.4						3.0
17	241	4.7						3.0
18	252	4.1						3.0
19	268	3.5						2.9
20	283	3.0						2.7
21	320	3.0						2.6
22	393	3.1						2.4
23	386	3.2						2.4

Time: Local.
Sweep: 2.2 Mc to 16.0 Mc in 1 minute.
*Average values except f°F2, which are median values.
#One or two observations only.

Table 26

Bagneux, France (48.8°N, 2.3°E) May 1948

Time	h'F2	f°F2*	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06	300	6.8	260					(2.9)
07	340	8.0	235					
08	370	6.8	230				4.4	(3.0)
09	370	8.7	225				4.1	2.7
10	395	9.0	220				4.5	2.5
11	400	9.5	240				4.2	2.7
12	395	8.6	240					2.6
13	410	9.0	280				4.4	(2.5)
14	400	8.6	245				4.4	(2.6)
15	365	8.6	235				4.1	(2.6)
16	370	8.6	250				4.0	2.7
17	360	8.8	270					2.8
18	300	8.6	280					(3.0)
19	300	9.0	290					(2.8)
20	280	7.7						
21	320	8.2						
22	330	7.8						
23								

Time: 0.0°.
Sweep: 3.9 Mc to 6.8 Mc, and 7.8 Mc to 13.5 Mc in 12 minutes, manual operation.
*Medians in this column were obtained from observed values of f°F2 and values derived from f^xF2.

Table 27

Fribourg, Germany (48.1°N, 7.8°E) May 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	(335)	7.4					2.4	2.4
01	340	6.9					2.6	2.4
02	340	6.7					2.5	2.3
03	340	6.3					2.5	2.3
04	340	5.8					3.3	2.4
05	290	6.4	290	3.5	130	2.0	3.6	2.5
06	360	6.8	262	4.1	115	2.6	4.4	2.6
07	395	7.3	250	4.8	110	3.2	4.0	2.5
08	385	7.8	240	5.2	110	3.5	4.8	2.6
09	410	8.4	230	5.7	110	3.7	4.5	(2.5)
10	435	8.6	235	5.7	110	3.9	4.6	2.4
11	420	8.8	230	5.8	110	3.9	5.0	2.4
12	405	8.7	230	6.0	110	4.0	4.6	2.5
13	400	8.6	225	5.9	110	3.9	4.6	2.4
14	422	8.7	240	5.7	110	3.9	4.7	2.5
15	405	8.5	240	5.6	110	3.7	4.5	2.5
16	390	8.3	250	5.6	110	3.4	4.4	2.6
17	360	8.4	260	5.0	110	3.1	4.1	2.6
18	285	8.4	260		120	2.6	3.6	(2.7)
19	288	(8.4)			140	1.8	3.1	(2.6)
20	290	(8.2)					3.2	(2.6)
21	295	(7.9)					2.8	(2.4)
22	320	(8.0)					2.6	(2.5)
23	320	(7.6)					2.5	(2.4)

Time: Local.
Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.

Table 28

Fribourg, Germany (48.1°N, 7.8°E) April 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	310	7.7					2.5	2.6
01	320	7.3					2.6	2.5
02	320	7.0					2.3	2.4
03	310	6.5					2.3	2.5
04	310	6.0					2.5	2.4
05	290	6.0				E	2.4	2.6
06	265	6.8			120	2.1	2.8	2.8
07	260	(7.7)	250		110	2.8	3.2	(2.9)
08	260	8.5	240	(5.0)	110	3.2	3.8	2.8
09	310	9.6	230	5.1	110	3.5	4.0	2.7
10	310	10.5	220	5.6	110	3.7	4.3	2.6
11	330	11.0	220	(6.0)	110	3.7	4.4	2.7
12	340	11.1	220	6.1	110	3.8	4.2	2.6
13	330	10.7	230	5.3	110	3.7	4.4	2.6
14	340	10.7	230	5.5	110	3.6	4.1	2.6
15	300	10.4	238	5.6	110	3.4	4.0	2.6
16	250	10.4	250		110	3.2	3.5	2.7
17	260	10.4			110	2.8	3.5	(2.8)
18	265	9.9			120	2.2	3.3	2.8
19	260	(9.8)			120	E	2.4	(2.7)
20	262	(8.6)					2.2	(2.8)
21	270	(8.2)					2.2	(2.6)
22	290	7.8					2.2	2.6
23	305	7.8					2.3	2.6

Time: Local.
Sweep: 1.6 Mc to 17.6 Mc in 10 minutes, automatic operation.

TABLE 29

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Form adopted June 1946

IONOSPHERIC DATA

h'F2 (Characteristic), Km (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E. J. W., J. J. S., J. M. C.

Calculated by: J. J. S., A. C. K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	250	250	260	250	260	250	230	230	200	210	200	230	210	230	230	230	220	200	210	230	(230)A	240	260	250
2	250	250	250	240	240	250	270	240	210	220	(220)A	220	230	220	220	230	220	C	C	C	C	240	250	250
3	250	270	270	260	250	250	250	230	220	(220)S	220	(230)B	230	(220)B	220	(220)C	[210]C	200	[210]A	(220)A	(220)A	230	240	250
4	250	230	250	250	230	250	250	230	210	210	220	230	230	230	220	220H	220	200	200	210	200	230	270	250
5	260	250	250	220	220	220	250	230	210	210	230	210H	230	250	220	230	210	A	A	210	210	240	240	250
6	250	300	310	280	260	230	240	240	210	210	220	230	260	(230)C	(230)A	(220)A	210	180	200	220	200	250	240	250
7	250	270	230	210	230	250	210	240	200	220	220	210	[220]C	230	230	230	220	210	210	200	200	220	230	250
8	290	290	270	290	280	250	250	270	220	200	230	230	240	230	220	220	220	200	200	200	200	240	250	250
9	240	260	280	250	210	250	250	260	210	220	220	230	230	250	250	230	240	200	230	230	230	250	250	280
10	260	280	280	250	230	240	240	230	210	210	210	220	210	230	220	(200)A	200	200	210	200	220	(270)S	260	250
11	230	240	250	250	250	250	230	230	220	210	220	250	240	(220)A	220	210	220	220	210	200	200	200	250	250
12	250	(260)FS	(300)S	300	290	250	220	230	210	210	210	240	240	220	230	240	220	(200)A	220	210	220	250	(290)AS	(280)A
13	(280)S	(280)S	290	280	250	250	250	220	210	210	230	210	200	240	240	230	210	210	230	210	250	250	240	270
14	260	300	350	240	230	200	250	250	230	230	230	230	230	230	230	230	200	210	220	190	220	220	250	250
15	250	250	270	260	250	250	300	240	220	230	220	230	230	230	200H	220	210	200	200	230	230	230	250	250
16	250	250	250	240	230	250	250	230	210	210	200	210	(230)S	230	[220]C	220	220	200	200	200	200	210	250	270
17	250	250	250	250	230	230	250	230	200	210	210	200	230	230	210	220	220	210	200	210	200	230	280	250
18	250	280	250	250	240	250	230	250	220	220	220	230	230	220	230	220	220	230	210	200	200	220	230	[240]C
19	250	260	260	260	250	200	250	230	220	210	230	240	(220)S	230	220	230	230	200	200	210	210	210	230	250
20	250	280	260	240	220	240	250	250	230	220	230	220	200	220	210	230	220	220	220	200	250	(230)A	250	260
21	250	290	260	250	250	270	340	270	220	220	210	230	250	230	230	230	220	200	220	210	230F	230	230	230
22	250	240	230	250	250	300	(330)S	250	220	220	220	200	220	[220]C	210H	210	220	200	200	220	200	220	230	250
23	250	270	260	250	230	250	270	230	220	210	230	220	220	210	240	230	210	200	200	220	210	250	250	250
24	270	320	350	310	250	(220)S	(270)S	250	230	230	210	(230)A	(230)B	250	220	220	230	210	220	270	(210)A	250	250	250
25	250	260	260	250	240	250	250	250	210	210	220	240	230	(230)S	230	230	230	200	200	210	210	240	240	220
26	230	260F	270	250	240	(250)A	250	(250)A	210	220	230	200	240	220	220	210	210	200	200	200	200	210	250	270
27	280	300	300	280	250	230	250	240	220	210	220	220	220	220	230	230	210	(200)A	200	200	200	230	(260)S	(250)S
28	270	300	280	250	250	240	240	220	220	210	220	230	220	200	220	230	220	200	210	240	240	[250]C	(260)C	(250)C
29	250	280	260	260	250	[250]A	250	240	220	220	220	220	210	230	230	230	220	210	190	220	220	250	250	260
30	260	270	270	270	[260]A	240	250	260	220	220	220	(220)B	230	240	240	220	230	200	220	250	220	250	250	250
31	240	260	260	270	270	310	(380)S	280	220	230	240	230	260	250	230	230	230	200	220	230	220	230	230	250
Median	250	270	260	250	250	250	250	240	220	210	220	230	230	230	220	230	220	200	210	210	210	230	250	250
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	29	29	30	30	31	31	31

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE

Form adopted June 1946

TABLE 30

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

IONOSPHERIC DATA

f_oF2 (Characteristic), Mc (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E. J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	4.1	3.9	3.8	3.8	3.9	(4.3)JS	4.5	5.7	8.2	9.8	10.0	11.0	12.2	(11.9)SP	11.2	(10.3)SC	10.3	P(9.3)SC	(7.7)JS	(7.1)S	6.3	5.1	4.5	4.8
2	4.8	4.5	4.9	4.7	4.3	4.1	(3.9)S	4.9	7.8	9.1	10.0	(11.2)SP	11.5	11.3	P(10.8)SC	P(11.2)SC	(10.3)SC	C	C	C	C	4.9	4.7	(4.8)SF
3	4.3	4.1	4.1	3.9	3.9	3.7F	3.3	4.7	7.7	9.0	9.5	10.7	11.6	(11.8)S	11.5	(11.3)C	[10.5]C	9.2	7.3	6.0	5.3	4.7	(4.4)JS	(4.3)JS
4	4.1	3.7F	(3.6)F	3.5F	(2.9)F	(3.1)F	(3.1)F	4.9	8.2	(9.3)SC	9.7	11.1	11.5	11.0	11.0	11.3	10.4	9.6	7.2	6.8F	5.5	(3.9)JS	(4.3)S	(4.5)JS
5	4.6	4.9	5.1	4.9	4.5	3.9F	(3.9)FS	5.4	8.3	9.2	10.3	10.8	10.8	11.2	11.3	(11.0)S	10.8	9.2	S(7.8)JF	(6.1)JS	(5.6)JS	4.5	4.3	(4.4)JF
6	F(4.3)JS	S(3.9)JF	(3.9)FS	(4.1)FV	(4.1)FS	(4.4)FS	4.3	5.1	7.9	9.7	(10.2)S	11.6	(11.3)C	(12.0)C	(12.4)SC	[12.1]SC	(11.8)CP	P(9.7)SC	(9.3)SP	8.0	(6.6)SC	6.4	6.5	(6.1)JS
7	5.8	(6.1)J	6.4	5.7F	(4.7)FS	4.5	(4.2)JS	5.1	7.8	9.7	10.5	10.9	12.0	11.6	(11.7)P	11.0	11.2	(10.3)P	(9.2)P	8.5	5.2	4.4F	(3.9)S	3.0F
8	2.8F	2.8F	3.1F	3.0F	3.2F	3.2F	3.9	5.2	8.2	10.3	(10.1)P	11.5	11.2	11.5	11.3	10.0	9.9	9.5	(7.8)JS	6.0	(5.0)S	(4.1)JS	S(4.1)JF	(4.0)JS
9	3.7	3.5F	3.7F	3.9F	3.8F	2.9F	2.7F	4.6	8.0	9.7	10.1	11.2	11.4	11.6	11.8	(11.4)SC	(10.8)PS	(9.3)SC	8.2	7.4	5.7	(4.4)FC	3.9F	4.1F
10	(4.0)JS	(4.6)F	4.7	4.9	4.5	4.1	3.7F	4.5F	7.1	9.0	(11.5)SC	10.6	10.8	11.0	10.4	(11.0)SC	C(10.6)JS	(9.4)S	8.3	(6.6)JS	5.7	5.4	5.2	(5.6)S
11	5.1	(4.7)S	4.6	4.3	3.9	(3.9)S	3.9	4.7	7.9	8.8	10.3	(11.4)S	11.7	10.8	(11.6)S	T(10.8)SC	11.7	Y(9.9)SC	8.7	7.0	5.6	4.5	(3.9)JS	3.8
12	3.1F	(2.7)F	(2.7)F	(3.0)F	(3.2)F	(3.6)F	3.7F	4.4	7.7	8.6	10.4	11.7	11.5	(11.5)S	11.5	11.3	10.8	8.8	7.0	6.6	5.7	4.2	3.1	3.1
13	3.0F	3.0F	3.0F	3.5F	(4.0)FS	4.2	(3.9)F	4.7	(7.6)S	8.8	9.7	10.6	(10.6)JS	10.8	11.2	11.5	10.2	9.6	8.1	(6.9)J	6.0	6.2	5.8	4.9F
14	4.3F	4.6	5.0	5.4F	5.4F	3.9F	3.1F	4.3F	7.7	(10.0)C	11.0	11.6	(12.0)P	12.0	11.7	11.6	11.6	(9.8)S	(9.5)S	(6.6)J	(6.8)J	4.6	4.3	3.9
15	3.5	3.5F	3.5F	3.4F	2.8F	2.3F	2.2F	3.6F	6.7	8.8	9.7	11.4	(11.4)J	11.8	11.5	(11.2)J	(10.1)J	8.7	7.8	7.3	(6.0)J	(5.0)J	(4.9)J	(3.9)JF
16	4.4F	(3.8)JF	(4.7)S	(5.1)F	4.5	4.3	4.1	5.0	7.9	9.3	9.8	11.0	(11.6)S	11.5	11.4	11.8	(11.5)CP	C(10.7)JS	9.3	8.0	6.3	4.8	4.9	4.7
17	(4.6)FS	(4.9)S	5.0	4.9	(4.6)S	3.9F	4.1	4.9	7.6	9.7	10.8	11.7	11.7	11.1	11.5	(12.2)SC	C(11.0)JS	(10.7)SC	8.0	7.1	5.9	(4.4)JS	3.8	(4.3)JS
18	4.2	4.3	4.6	4.5	(4.3)JS	3.7	2.9	3.7	7.2	9.5	10.3	11.3	[11.8]C	11.7	(11.1)SC	(11.1)SC	11.3	11.6	8.4	(6.7)S	6.3	5.7	4.2	[4.0]C
19	(3.9)F	3.9F	(4.3)FS	(4.8)S	(4.7)FS	(4.1)JS	3.2	4.2F	8.9	9.8	10.7	11.7	11.8	11.8	11.3	10.8	(10.7)JS	(10.0)JS	9.2	7.1	5.8	(4.8)FS	(4.1)JS	(3.9)JS
20	3.7F	3.7F	3.7F	(3.7)FS	3.4F	3.0F	2.8F	3.6F	7.7	9.7	(12.0)S	11.3	(11.8)Z	12.3	11.4	(11.6)S	11.4	(10.7)JS	9.4	7.8F	6.2	5.0F	4.6F	(4.7)S
21	4.5	4.6	4.9	4.5	(4.0)JS	(2.8)F	(2.5)F	(3.8)SF	6.9F	9.5	(10.2)JS	11.5	11.8	12.5	13.4	P(13.0)SC	13.0	11.9	9.7	8.1	(7.3)FS	7.3	6.6	5.3
22	5.5	(4.8)F	5.0F	(3.5)FS	2.2F	2.2F	2.4F	4.0F	8.0	9.7	10.5	11.7	12.0	[12.4]C	12.2	11.5	11.7	10.0	(8.0)S	(8.0)JS	(6.5)JS	(4.8)F	(3.8)FS	(3.8)FS
23	(3.7)FS	(3.7)FS	S(3.9)JF	S(4.1)JF	(3.4)FS	(3.3)F	3.5F	S(4.7)JF	7.9	9.6F	10.3	11.4	12.0	11.8H	11.4	11.7	(10.5)S	(9.3)S	8.3	7.5	(5.6)S	(4.8)FS	4.5	4.7
24	S(3.9)JF	(2.5)F	(2.4)F	(3.1)F	(4.3)S	(3.8)FS	(3.6)F	4.5F	7.5F	9.9	(11.1)S	12.8	12.7	12.2	11.8	11.4	(11.4)S	P(10.0)SC	9.4	8.3	5.7F	5.7F	5.4	5.3
25	4.9	4.9F	5.0	4.9	4.8	4.7	4.7	4.8	7.7	9.6	11.4	11.8	12.5	12.0	13.0	(13.3)S	(13.6)SP	P(12.2)SC	9.8	8.9	7.9	7.7	7.5	(6.7)JS
26	(4.2)FS	(2.5)F	(3.0)FS	3.2F	3.1F	3.1F	(3.1)FS	3.7F	7.6	9.5	10.2	10.4	11.8	11.7	(10.7)S	10.4	10.9	(10.7)S	(9.8)S	7.5	5.5F	4.6	(3.7)FS	3.2F
27	3.1F	3.1FS	2.9	3.1	3.2F	3.2	3.1	(4.0)FS	7.5	9.7	(9.9)S	(10.7)JS	12.0	12.0	11.6	P(12.3)SC	(12.4)C	P(10.6)SC	8.7	6.7	5.4	3.6	3.2	3.1
28	2.9	(2.8)C	(3.0)F	3.2F	3.4	3.4F	3.5F	4.2	7.6	8.8	(9.8)SC	[11.5]C	11.5	11.0	11.3	11.5	(11.2)SC	C(10.3)JS	8.3	(7.2)JC	(5.1)JC	[4.3]C	4.0	(3.7)C
29	3.7	3.5F	3.7	3.7	3.8	(3.5)S	(3.4)FS	4.5F	7.6	9.3	10.2	10.7	12.2	12.4	12.0	(11.8)J	(11.0)J	(10.0)P	8.8	7.3	5.8	4.9	4.2	3.9
30	3.7	3.4F	3.4	3.5	3.4	3.3	3.1	3.8	7.2	8.4	10.6	(10.4)P	11.6	11.9	11.6	(12.7)J	(12.2)JP	[10.4]S	(9.6)P	7.8	6.2	6.1	(5.8)JF	(4.8)F
31	3.9	3.6	3.4	3.1F	3.0F	[2.5]F	2.0	3.1F	7.0	9.9	(10.9)JS	(11.6)S	12.2	13.0	(12.5)S	12.0	10.8	(9.5)S	7.7F	7.7	S(6.6)JF	5.3FS	4.5F	[4.1]SF
Median	4.1	3.8	3.9	3.9	3.9	3.7	3.5	4.5	7.7	9.5	10.3	11.3	11.7	11.8	11.5	(11.4)	(11.0)	(10.0)	8.4	7.2	5.8	4.8	4.3	(4.3)
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	31	31	31

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

Form adopted June 1946

TABLE 31

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

IONOSPHERIC DATA

foF2 (Characteristic), Mc (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E. J. W., J. J. S., J. M. C.

Calculated by: J. J. S., A. C. K.

Day	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330
1	3.9	3.9	3.8	3.9	4.2	4.3	4.6	7.2	(9.2)SC	9.9	10.8	(12.0)SC	(11.7)C	[11.6]SC	S[10.7]CP	10.8	S(9.5)CP	S(9.0)CP	7.5	6.4	5.8	4.7	4.7	4.7
2	(4.4)JS	4.9	4.6	4.5	4.3	3.9	(3.9)S	(6.8)S	S(9.1)CP	J(9.5)SC	(10.0)JS	11.6	(11.4)SC	(10.8)SC	(11.2)SC	[10.6]C	(9.9)SC	C	C	C	C	4.7	4.7	(4.9)FS
3	4.1	4.1	3.9	3.8F	3.8	(3.5)S	3.3F	6.3	8.8	[9.3]C	(11.2)SC	[11.2]C	(11.8)S	(11.7)C	11.3	[11.0]C	S(9.8)CP	8.1	6.5	5.7	4.9	J(4.5)SC	(4.2)JS	(4.1)S
4	(3.9)FS	(3.7)FS	(3.1)FS	(3.1)F	2.9F	(2.9)FS	(3.9)JS	6.8	S(9.3)CP	(9.4)P	10.8	11.6	11.3	11.3	10.9	10.8	[10.0]SC	8.5	7.3	6.4	(4.5)JS	(4.1)JS	(4.5)JS	4.3
5	4.8	5.1	5.1	4.9	(4.2)FS	(3.6)F	(4.0)FS	7.3	9.1	9.3	9.3	11.5	10.4	(11.8)SC	11.4	(11.4)S	(9.8)SC	8.4	(7.5)JS	(6.0)JS	4.7	4.3	4.3	J(4.3)SF
6	(3.9)S	3.9	(3.9)SV	4.3V	(4.4)S	4.3	(4.3)S	6.7	9.4	9.8S	11.2	11.5	11.8	12.4	(12.2)F	[11.9]C	J(10.6)SC	S(9.7)CP	8.4	(7.7)JS	(6.3)JS	6.7	6.0	5.9
7	(5.9)JS	6.4	[6.3]SC	(4.9)JS	J(4.3)SF	4.7	(4.1)JS	6.7	S(9.8)CP	9.7	10.8	11.6	11.6	(11.8)P	(10.8)P	11.0	(10.4)P	9.5	8.7	7.5	4.7	(4.3)S	3.2F	2.9F
8	2.8F	3.0F	3.1F	3.0F	3.2F	3.1F	4.0	6.6	9.6	10.0	(10.6)S	[11.4]S	12.0	11.8	10.5	(10.3)S	S(9.5)CP	8.8	S(6.8)CP	5.4	4.3F	(4.1)JS	J(4.1)FS	(4.1)JS
9	3.6F	3.6F	3.9F	3.9F	3.1F	2.8F	2.8F	6.2	8.7	9.4	10.8	11.4	12.0	11.9	11.5	11.2	9.7	8.1	(7.6)J	6.4	4.7	(4.3)F	(3.9)S	(3.7)FS
10	4.1	4.8	5.2	4.7	4.3	4.1F	4.2	(5.9)F	8.8	9.8	11.0	11.5	11.1	11.0	(11.0)SC	S(11.2)CP	(10.3)SC	9.8	(7.4)JS	(6.3)JS	5.1	5.3	(5.3)S	(5.5)S
11	4.9	(4.7)S	4.5	(4.0)JS	4.1	3.9	(3.5)JS	6.4	8.6	9.8	11.7	[11.4]SC	11.5	11.6	11.5	S(10.8)CP	11.6	8.9	8.2	6.3	4.9	(4.0)JS	3.6	(3.6)FS
12	2.8F	(2.5)F	(2.7)F	(3.1)F	(3.5)F	(3.8)F	3.4F	6.1	8.3	9.9	10.7	11.5	11.3	11.3	11.0	10.7	9.8	(7.6)JS	7.3	6.3	5.0	3.4	3.2	3.1
13	3.0F	2.9F	(3.3)F	3.7F	4.1	(4.1)FS	(4.0)S	6.0	9.0	9.2	10.5	10.8	[10.8]C	10.7	11.4	[10.9]C	8.8	(7.0)J	6.0	6.0	5.9	5.6	4.9F	4.9
14	4.2F	4.9	5.2F	5.2F	4.7F	3.1F	3.2F	6.4	8.8	10.0	11.3	(12.5)P	(12.6)P	11.9	11.7	11.6	10.6	9.5	8.5	(6.2)S	5.6	(4.2)J	4.0	3.6
15	3.4F	3.4F	3.3F	2.6F	2.4F	2.2	2.5F	5.8	8.3	[9.4]C	11.0	(11.6)P	[11.8]C	11.4	11.5	(13.1)J	(10.0)JS	9.4	7.6	(6.4)J	5.2	4.6	4.7	(4.0)JS
16	4.5F	4.6F	4.9	4.9	4.3	4.2	4.4	6.4	9.4	9.5	10.0	11.4	(12.2)C	[11.3]C	[11.6]C	[11.7]C	(11.6)SC	9.6	9.0	6.9	5.6	4.8	4.7	4.6
17	(4.9)JS	(5.0)S	(5.0)JS	(4.7)JS	(4.3)S	4.1	4.2	6.7	8.8	(10.5)C	11.9	12.0	11.4	(11.4)SC	11.4	(11.3)SC	J(9.9)SC	9.2	7.5	6.8	5.1	(3.9)S	J(3.9)SF	(4.2)JS
18	4.3	4.6	4.5	4.3	4.1	3.5	(2.9)F	5.5	9.0	10.8	10.7	11.3	11.9	(11.7)S	(11.4)SC	[11.2]SC	11.3	8.9	8.4	(6.9)SC	6.4	4.7	[4.1]C	[4.0]C
19	(4.0)FS	(4.1)FS	(4.7)FS	(4.8)FS	(4.5)FS	(3.7)CF	3.7	6.2	9.7	(10.1)SP	11.2	(11.9)S	11.7	(11.9)S	11.4	11.3	(10.6)JS	9.4	7.8	6.4	5.6	J(4.5)FS	J(3.9)FS	(3.9)JS
20	3.7	(3.7)F	(3.9)FS	3.7F	3.3F	2.9F	2.7F	5.6	8.8	11.0	11.7	11.6	12.3	12.3	11.7	11.9	(11.6)S	9.8	8.7	7.6	5.6	4.7F	(4.7)FS	(4.7)S
21	(4.4)FS	4.7	4.7	4.2	(3.3)F	(2.7)F	2.8F	5.5F	8.3	(10.0)S	10.4	(11.4)C	(12.2)C	12.8	12.7	13.0	12.6	11.0	8.9	(7.9)JF	7.5F	7.0	6.5	5.4F
22	(5.5)S	5.1F	(4.3)FS	(2.4)FS	2.2F	2.2F	J(2.7)FS	5.9	9.3	10.2	11.4	11.8	[12.2]C	(12.5)SC	11.8	11.7	(11.6)S	9.5	(8.0)JS	(7.4)FS	(5.5)FS	J(4.4)SF	(4.1)JS	(3.7)FS
23	(3.7)FS	(3.7)FS	J(4.1)FS	(3.5)F	(3.5)FS	(3.3)F	3.7F	(6.3)FS	8.8	10.3	(10.7)S	[11.7]C	12.2	(11.6)S	11.5	11.8	(10.3)S	9.1	(7.9)JS	6.1	4.9F	(4.5)J	(4.4)JS	J(4.1)FS
24	(2.9)F	(2.4)F	(2.8)F	(3.9)FS	4.3	(3.8)FS	3.7F	5.7F	8.8	(10.6)S	11.7	12.5	11.8	11.5	11.5	11.8	S(10.6)CP	9.5	8.8	7.5FS	5.5F	5.5	4.7	5.2
25	4.9	4.9	4.9	4.9	4.7	(4.6)S	4.4	6.6	8.9	10.0	10.6	11.9	12.3	12.2	13.4	(13.8)SP	S(12.8)CF	S(10.8)CP	9.4	8.9	7.9	7.5	7.3	(6.2)J
26	(3.3)F	(2.9)F	[3.1]FS	3.1F	3.1F	3.0F	2.7	5.9	8.8	10.1	10.0	11.4	11.7	11.0	10.4	10.8	(11.1)S	(10.3)S	8.7F	6.3	5.1	4.7F	3.5F	3.2F
27	3.1F	2.9	3.0	3.3	3.3	3.1	3.1	5.9	9.2	9.7	(10.8)J	12.0	12.0	11.6	(11.8)C	(11.8)S	(12.0)C	9.5	7.5	(6.5)JS	(3.9)F	3.3	3.1	3.0
28	2.8	2.8	3.2	3.2F	3.4	3.5F	3.7	5.9	(8.3)C	9.2	(10.5)J	11.5	11.5	11.1	11.4	(11.7)S	[10.8]SC	9.0	7.1	6.3	(4.5)C	[4.1]C	[3.8]C	3.7
29	3.5	(3.7)FS	3.7	3.8	3.7	(3.5)FS	3.5F	5.9	9.2	10.0	10.2	11.0	[12.3]C	(12.0)J	[11.9]SC	(11.8)J	(11.2)J	(9.6)P	7.9	6.5	5.4	4.4	3.8F	3.7
30	3.4F	3.6	3.4	[3.5]A	[3.4]A	3.2	3.0	5.6	8.3	(10.0)JP	(10.6)P	(11.4)F	11.5	12.0	12.6	(11.0)J	(11.0)J	[9.9]S	8.8	7.8	6.1	6.0	(5.2)F	(4.8)J
31	3.6	3.6	3.4	3.0F	3.1	2.1F	2.3F	(5.5)J	8.4	(9.7)S	J(10.8)SH	(11.7)S	12.2	12.8	(12.4)Z	11.2	(10.7)JS	(8.3)SF	7.7	7.6F	5.5F	4.8FS	(4.4)FS	[3.7]SF
Median	3.9	3.9	3.9	3.9	3.8	3.5	3.7	6.2	8.8	9.9	10.8	11.5	11.8	11.7	11.5	(11.3)	(10.6)	9.4	7.8	6.4	5.3	4.5	4.3	(4.1)
Count	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	30	30	30	31	31	31

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 32

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

Form adopted June 1946

IONOSPHERIC DATA

h'F1 (Characteristic), Km (Unit), December (Month), 1948

Observed at Washington, D.C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: A.C.K., J.J.S.,

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1												210	Q	210	220	Q	Q									
2										Q			210	Q	Q			C								
3																	C									
4											200	200	220	200												
5											200	Q		200	210											
6										Q	200	Q	Q													
7														200	Q	Q	Q									
8										Q	210	Q	210	Q	210	Q										
9																										
10																										
11												(230)^{S}	230													
12											210	(220)^{S}	210	Q		220										
13											200	Q	Q	200	200	230	C									
14																										
15														210												
16																										
17													210	(200)^{C}												
18																										
19											200	(210)^{S}				200										
20											210															
21													230	220												
22																										
23											220			200	210	200										
24											200			210												
25																										
26											210		200													
27																										
28											210															
29											210															
30														230	200											
31													210	220	210											
Median											210	(210)	210	205	210											
Count											13	5	9	12	7											

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 33

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

IONOSPHERIC DATA

f₀F1 (Characteristic), Mc (Unit), December (Month) 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

National Bureau of Standards (Institution)

Scaled by E. J.W., J.J.S., J.M.C.

Calculated by J.J.S., A.C.K.

75°W Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1												L	Q	L	L	Q	Q							
2										Q			L	Q	Q			C						
3																	C							
4											L^H	L	L	L										
5											L	Q		L^H	L									
6										Q	L	Q	Q											
7														L	Q	Q	Q							
8										Q	L	Q	L	Q	L	Q								
9																								
10																								
11												L	L											
12											L	L	L	Q		L								
13											L	Q	Q	L	L	L	Q							
14														L										
15																								
16																								
17													L	$(L)^C$										
18												L	L											
19											L	L				L								
20											L													
21													L	L										
22											L			L	L	L								
23											L			L										
24																								
25																								
26											L		L											
27																								
28											L													
29											L													
30														L	L									
31													L	L	L									
Median																								
Count																								

Sweep 1.0 Mc to 25.0 Mc in 0.25 ...

Manual ☐ Automatic ☒

TABLE 34

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

Form adopted June 1946

IONOSPHERIC DATA

h'E (Characteristic), Km (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									100	120	100	(100)^{A}	(100)^{A}	(100)^{A}	110	110	110							
2									110	(100)^{A}	A	A	(110)^{A}	A	110	A	110	C						
3									140	B	B	B	B	(100)^{A}	(100)^{A}	(100)^{A}	C							
4									110	110	(120)^{A}	(100)^{A}	(110)^{A}	100	(110)^{A}	(110)^{A}	(100)^{S}							
5									A	100	100	100	100	A	100	100	(120)^{A}							
6									(130)^{A}	A	100	90	100	(100)^{A}	(100)^{A}	(100)^{A}	(100)^{C}	110						
7									100	100	(100)^{A}	100	(100)^{C}	100	100	100	110							
8									100	A	(110)^{A}	A	100	(100)^{A}	100	A	110							
9									100	(100)^{A}	100	A	(100)^{A}	100	100	100	A							
10									(110)^{A}	(100)^{S}	100	100	110	100	100	A	A	S^{C}						
11									120	100	100	100	100	100	A	100	S^{C}							
12									(120)^{A}	100	100	100	100	100	100	100	A							
13									100^{F}	100	100	100	100	110	110	100	A							
14									A	100	100	100	110	C	100	100	100	C						
15									(150)^{C}	100	100	100	110	90	100	100	100							
16									(120)^{A}	(100)^{A}	100	100	100	100	C	100	110							
17									(110)^{A}	(100)^{A}	100	100	100	100	100	A	A							
18									100	100	100	100	100	100	(100)^{A}	100	100	110						
19									(100)^{A}	100	100	100	100	100	100	100	100							
20									A	A	(110)^{A}	100	100	100	100	100	(100)^{A}	150						
21									A	100	100	100	100	100	100	100	100							
22									A	100	100	100	100	C	100	100	100							
23									A	(110)^{A}	A	A	100	(90)^{C}	100	100	S							
24									(120)^{A}	100	100	A	B	100	100	A	A							
25									120	100	100	100	100	100	100	100	100							
26									A	100	100	100	(90)^{S}	100	100	100	100							
27									130	100	100	100	100	100	100	100	100							
28									130	100	100	C	100	100	100	100	90							
29									A	90	90	(100)^{C}	100	(100)^{S}	(110)^{S}	110	110							
30									(130)^{C}	110	(120)^{C}	B	110	100	(110)^{C}	B	B							
31									120	100	A	120	(130)^{B}	(120)^{S}	(130)^{S}	B	B							
Median									120	100	100	100	100	100	100	100	100							
Count									23	27	27	23	29	27	29	24	20							

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1946 O - 702519

TABLE 35

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Form adopted June 1946

IONOSPHERIC DATA

f_oE (Characteristic), Mc (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									(2.1)H	2.8H	3.0	3.2	3.3	3.2	3.0	2.7	(2.0)A							
2									(2.2)H	2.7	A	A	3.3	[3.1]A	2.9	[2.4]A	2.0	C						
3									2.7	B	B	B	B	A	A	A	C							
4									(2.1)H	(2.8)C	(3.1)H	3.3	(3.5)H	3.2	2.9	2.7	2.1							
5									2.3H	2.8H	3.1H	(3.2)AF	3.2	(3.3)H	(3.2)H	(2.7)A	(2.2)H							
6									2.3H	2.7	3.1	3.2	A	AC	A	A	2.3H	1.5						
7									2.3	2.7	3.1	3.3H	(3.3)C	3.3	3.1	2.6	2.1							
8									A	(3.0)A	3.2	[3.3]A	3.5	3.3	(3.2)C	[2.8]A	(2.3)SC							
9								2.1	2.2H	(2.5)AH	3.0	3.1	3.2	3.2H	[2.6]A	(2.4)S	A							
10									(2.3)H	2.7	3.2	3.3	3.3	3.3	(3.2)C	[2.8]A	2.3	1.8						
11									2.1	(2.8)SC	(3.1)H	(3.3)C	3.3	3.3	[3.1]A	(2.9)C	(2.3)S							
12									(2.2)S	(2.8)S	3.1	(3.4)S	(3.4)SC	3.3	(3.1)SC	(2.5)SC	A							
13									(2.3)HF	2.7	(3.2)C	3.2	3.3	3.3	3.2	(2.4)S	A							
14									A	2.4	3.2	3.2	(3.4)B	[3.3]C	3.2	2.9	2.2	1.7						
15									2.2	[2.6]A	3.1	3.2	3.3	3.3	3.1	2.7	2.1							
16									2.1	(2.9)H	3.1	3.3	(3.4)SC	3.1	[3.0]C	(2.9)H	(2.3)C							
17									2.3H	2.8	3.1H	(3.3)H	(3.3)C	(3.1)AC	C	A	2.3							
18									2.2H	(2.9)A	3.2	3.3	3.3	(3.5)S	3.1	(2.7)A	2.5H	2.1H						
19									(2.2)H	(2.5)S	3.1	3.2	3.4	3.3	3.1	(2.7)C	(2.1)H							
20									2.2H	[2.7]A	(3.2)A	3.5	(3.5)C	3.5	3.1	[2.7]C	2.3	2.0						
21									2.3	(2.4)H	(3.1)H	3.3	(3.5)F	(3.5)F	3.2	2.7	2.3							
22									A	2.5	(3.1)H	(3.3)F	3.4	[3.4]C	3.3	2.7	A							
23									A	3.0	(3.1)A	[3.2]A	3.4	3.3	2.9	(2.6)A	S							
24									2.3H	2.9	3.2F	A	B	(3.5)SC	2.9	A	A							
25									1.9	2.7H	3.1	3.3	3.6	3.5F	[3.2]A	2.8	(2.1)A							
26									A	S	3.2	3.4	3.7	3.3	3.2H	2.9	2.2							
27									(2.3)H	2.7	3.1	3.3	3.4	3.5	3.3	2.9	2.1							
28									2.0	2.8	3.0	[3.2]C	3.3	3.2	(3.1)C	[2.8]C	2.4							
29									A	(2.7)SC	3.0	3.1	(3.3)C	3.3	3.1	A	B							
30									2.2H	[2.8]C	3.3	[3.4]B	(3.5)C	3.2	(3.1)C	B	B							
31									2.2H	(2.5)S	[2.9]A	3.3	3.4	3.4	3.1	B	B							
Median									2.2	(2.7)	3.1	3.3	3.4	3.3	3.1	(2.7)	2.2	1.8						
Count									25	29	29	28	28	29	28	24	21	5						

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1946 O - 702510

Form adopted June 1946

TABLE 36

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

IONOSPHERIC DATA

Es (Characteristic), Mc,Km (Unit), December (Month), 1948

National Bureau of Standards (Institution)

Observed at Washington, D. C.

Lat. 39.0°N, Long. 77.5°W

75°W Mean Time

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: A.C.K., J.J.S.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1												3.2 100	2.7 100	3.0 90	2.9 100	2.7 120	2.3 110	3.1 100	3.5 100	3.4 100	5.2 100	3.7 100	2.9 100	3.1 100
2	3.1 100	3.7 100	3.1 100	2.9 100		3.8 100				3.2 100	5.7 100	3.9 100	3.0 100	3.3 100		3.2 100		C	C	C	C			
3				2.4 100							3.6 110			3.1 100	3.5 100	2.9 100	C	3.2 90	5.4 80	5.9 100	4.2 100	2.1 120	3.0 100	
4		3.2 90	3.2 100	3.0 100				2.1 110	3.0 100	3.9 100	4.3 100	3.2 100	3.1 100	2.9 100	3.0 100	3.0 100		3.4 90	3.2 90			2.9 100	3.8 100	3.0 100
5	3.0 90		3.2 90					4.5 100	3.7 100		3.2 100	3.2 100		3.0 90		6.6 100	10.0 100	6.6 100	11.0 100	3.7 100			3.2 90	3.1 100
6				3.1 100		3.2 100	3.2 100	2.8 100	3.2 100	4.1 100		3.5 110	3.8 100	3.6 100	4.0 100	3.8 100		3.4 100	2.8 100	3.0 110	3.2 120			
7											3.0 100								1.7 90				2.0 160	
8				4.4 100	3.0 100		3.7 100	8.0 100	4.9 100	4.3 100	3.6 100	5.6 100		3.3 90	2.5 90	2.3 90	1.9 90				6.7 100	3.9 100		
9	1.9 100						3.9 100			3.1 100	2.8 100	3.2 100	6.4 100	7.5 100	5.4 100	5.2 100	3.6 100	5.6 100	5.4 100					
10		3.6 100		2.2 100					2.1 100	3.2 120	2.2 90					4.9 100	2.4 100							
11	3.1 90		3.3 80									5.0 120	4.3 110	6.8 100	4.0 100		2.4 120		3.2 100				2.3 90	
12	1.9 100		2.1 80	3.2 100	3.5 100				2.2 100								8.8 100	6.0 100	5.0 100	3.2 90	3.6 100	4.9 90	3.8 100	3.6 100
13	3.4 90	1.9 90			2.8 90	1.7 100		1.9 90	4.3 80	2.0 90	3.6 90			2.6 110			2.0 90	2.0 90						
14									3.1 100					C										
15										3.0 100			3.2 90		2.0 90				3.2 100					
16							2.0 100		2.0 100	2.0 90					C									
17			2.4 100	3.4 100	2.4 100	2.4 100	3.1 100	3.1 100	2.3 100	2.1 100				4.8 100	3.3 100	3.7 100	1.9 100	1.9 100				2.3 100	2.0 100	2.0 100
18																								C
19							1.9 100		2.2 100	1.9 100	1.9 90							3.5 100						
20									3.3 90	3.9 90	3.5 90	3.5 90	1.9 90				1.8 100		3.2 90		1.9 100	2.3 100	2.2 100	
21				3.8 100	4.6 100	3.8 100	2.2 100									4.6 110	4.3 100	2.2 100						
22								2.1 100	3.5 100					C	4.0 100	5.6 100	7.2 100	3.2 100	6.0 100	2.5 100	2.0 100	3.3 100		3.7 100
23	2.1 100					3.9 100	4.8 100	3.2 90	3.6 100	2.3 100	3.6 90	5.6 (90)[c]	3.6 100	3.5 100	3.3 100	2.9 100	S	2.0 100	2.0 100	3.6 90				
24									1.9 100			8.0 100	B		3.3 100	5.8 100	4.7 100	4.5 100	3.6 90	2.1 90	2.0 90			
25															3.5 100	3.2 100	3.5 100	1.8 100						
26	5.2 110					3.3 100	4.0 100	4.8 100	8.0 100								2.5 100	2.0 90						
27																	2.4 100	6.0 100	1.9 100			3.1 100		
28									4.1 100	2.3 90	1.9 90	C						2.3 90	2.1 90	3.4 90		C		2.1 100
29				2.1 100	3.7 100	7.0 100	2.9 100	2.6 100	3.4 100							3.1 110					2.0 100	3.2 100	2.0 100	
30				5.0 100	7.4 100	5.9 100	3.4 100											2.2 90					2.0 (150)[s]	
31								3.3 150			10.6 100													
Median	**	**	**	**	**	**	**	**	2.1	**	**	**	**	**	**	2.3	1.9	2.0	1.8	**	**	**	**	**
Count	31	31	31	31	31	31	31	31	31	31	31	30	30	29	30	31	29	30	30	30	30	30	31	30

** MEDIAN fEs LESS THAN MEDIAN foE, OR LESS THAN LOWER LIMIT OF RECORDER.

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1946 O - 702519

Form adopted June 1946

TABLE 37

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

IONOSPHERIC DATA

F2-M1500 (Characteristic), ____ (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E. J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	2.0	2.0	2.1^{V}	2.0^{V}	1.9	(2.0)$^{J}_{S}$	2.0	2.3	2.4	2.2	2.3	2.2	2.2	(2.3)$^{S}_{P}$	2.2	(2.4)$^{S}_{C}$	2.3	^{P}(2.4)$^{S}_{C}$	(2.2)$^{J}_{S}$	(2.1)^{S}	2.3	2.1	1.9	2.0
2	2.0	2.0	2.0	2.1	2.0	2.0	(1.9)^{S}	2.2	2.4	2.3	2.3	(2.1)$^{S}_{P}$	2.3	2.2	^{P}(2.2)$^{S}_{C}$	^{P}(2.2)$^{S}_{C}$	(2.3)$^{S}_{C}$	C	C	C	C	2.0	2.0	(2.0)$^{S}_{F}$
3	2.0	1.9	1.9	1.9	2.0	2.0^{F}	2.2	2.1	2.3	2.2	2.3	2.2	2.2	(2.2)^{S}	2.1	(2.3)^{C}	C	2.2	2.2	2.2	2.2	2.1	(2.2)$^{J}_{S}$	(2.1)$^{J}_{S}$
4	2.2	2.1^{F}	(2.1)^{F}	2.1^{F}	(2.2)^{F}	(2.1)^{F}	(2.0)^{F}	2.1	2.5	(2.5)$^{S}_{C}$	2.3	2.3	2.2	2.3	2.3	2.2	2.4	2.3	2.1	2.2^{F}	2.2	(2.1)$^{J}_{S}$	(1.9)^{S}	(2.0)$^{J}_{S}$
5	2.0	2.0	2.0	2.0	2.1	2.0^{F}	(1.9)$^{F}_{S}$	2.2	2.4	2.5	2.4	2.2	2.2	2.2	2.2	(2.4)^{S}	2.3	2.3	^{F}(2.2)$^{J}_{S}$	(2.3)$^{J}_{S}$	(2.2)$^{J}_{S}$	2.0	2.1	(2.0)$^{J}_{F}$
6	^{F}(2.0)$^{J}_{S}$	^{F}(1.8)$^{J}_{S}$	(1.7)$^{F}_{S}$	(1.9)$^{F}_{V}$	(1.9)$^{F}_{S}$	(1.9)$^{F}_{S}$	2.0	2.2	2.3	2.3	(2.2)^{S}	2.2	(2.2)^{C}	(2.1)^{C}	(2.2)$^{S}_{C}$	S^{C}	(2.2)$^{C}_{P}$	^{P}(2.2)$^{S}_{C}$	(2.0)$^{S}_{P}$	2.1	(2.0)$^{S}_{C}$	1.9	1.9	(2.0)$^{J}_{S}$
7	1.9	(1.9)^{J}	2.1	2.3^{F}	(2.1)$^{F}_{S}$	2.0	(2.1)$^{J}_{S}$	2.0	2.3	2.6	2.4	2.3	2.4	2.2	(2.1)^{P}	2.1	2.1	(2.2)^{P}	(2.1)^{P}	2.1	2.3	1.9^{F}	(2.3)^{S}	2.0^{F}
8	1.9^{F}	1.9^{F}	2.1^{F}	2.1^{F}	2.0^{F}	2.0^{F}	2.1	2.2	2.4	2.4	(2.5)^{P}	2.3	2.2	2.1	2.2	2.3	2.3	2.1	(2.2)$^{J}_{S}$	2.3	(2.1)^{S}	(2.4)$^{J}_{S}$	^{P}(2.2)$^{J}_{S}$	(2.0)$^{J}_{S}$
9	2.1	1.9^{F}	1.9^{F}	2.1^{F}	2.3^{F}	1.9^{F}	2.1^{F}	2.0	2.4	2.3	2.3	2.2	2.2	2.1	2.1	(2.1)$^{S}_{C}$	(2.4)$^{P}_{S}$	(2.4)$^{S}_{C}$	2.1	1.9	2.3	(1.9)$^{F}_{C}$	1.9^{F}	1.9^{F}
10	(1.9)$^{J}_{S}$	(1.9)^{F}	2.0	2.1	1.9	2.0	2.1^{F}	2.2^{F}	2.3	2.2	(2.1)$^{S}_{C}$	2.3	2.2	2.3	2.3	(2.0)$^{S}_{C}$	^{C}(2.2)$^{J}_{S}$	(2.0)^{S}	2.1	(2.1)$^{J}_{S}$	2.1	1.9	1.9	(2.0)^{S}
11	2.2	(2.0)^{S}	2.0	2.0	1.9	(2.1)^{S}	2.2	2.2	2.4	2.4	2.2	(2.4)^{S}	2.2	2.3	(2.0)^{S}	^{P}(2.2)$^{S}_{C}$	2.1	^{P}(2.3)$^{S}_{C}$	2.1	2.3	2.1	2.1	(1.9)$^{J}_{S}$	2.1
12	2.1^{F}	(1.9)^{F}	(1.9)^{F}	(1.9)^{F}	(2.0)^{F}	(2.1)^{F}	2.2^{F}	2.1	2.3	2.3	2.3	2.3	2.2	(2.2)^{S}	2.2	2.1	2.3	2.3	2.1	2.2	2.3	2.2	1.9	1.9
13	1.9^{F}	1.9^{F}	1.8^{F}	2.0^{F}	(1.9)$^{F}_{S}$	2.0	(2.1)^{F}	2.1	(2.4)^{S}	2.4	2.4	2.3	(2.4)$^{J}_{S}$	2.1	2.1	2.2	2.2	2.1	2.1	(2.1)^{J}	2.0	1.9	1.9	1.9^{F}
14	1.8^{F}	1.7	1.8	2.1^{F}	2.0^{F}	(2.4)$^{F}_{S}$	1.8^{F}	2.0^{F}	2.5	(2.2)^{C}	2.1	2.2	(2.0)^{P}	2.1	2.1	2.2	2.1	(2.3)^{S}	(2.1)^{S}	(2.4)^{J}	(2.2)^{J}	2.0	2.0	2.2
15	2.2	1.9^{F}	2.0^{F}	1.9^{F}	2.1^{F}	2.2^{F}	2.1^{F}	1.9^{F}	2.3	2.3	2.4	2.2	(2.0)^{J}	2.1	2.2	(2.1)^{J}	(2.2)^{J}	2.0	2.2	2.1	(2.2)^{J}	(2.1)^{J}	(2.1)^{J}	^{S}(2.0)$^{J}_{F}$
16	2.1^{F}	F^{S}	(2.0)^{S}	(2.1)^{F}	2.2	1.9	2.0	2.3	2.5	2.3	2.3	2.1	(2.1)^{S}	2.1	C	2.0	(2.4)$^{C}_{P}$	^{C}(2.2)$^{J}_{S}$	2.2	2.1	2.2	2.0	2.0	1.9
17	(1.9)$^{F}_{S}$	(2.1)^{S}	2.0	2.1	(2.0)^{S}	2.0^{F}	2.0	2.3	2.3	2.4	2.1	2.1	2.3	2.3	2.1	(2.3)$^{S}_{C}$	^{C}(2.2)$^{J}_{S}$	(2.3)$^{S}_{C}$	2.2	2.1	2.3	(2.1)$^{J}_{S}$	1.9	(2.0)$^{J}_{S}$
18	1.9	1.9	1.9	1.9	(2.0)$^{J}_{S}$	2.1	2.0	2.0	2.4	2.4	2.3	2.2	[2.2]^{C}	2.1	(2.2)$^{S}_{C}$	(2.2)$^{S}_{C}$	2.1	2.2	2.4	(2.2)^{S}	2.2	2.0	2.0	C
19	(2.0)^{F}	1.9^{F}	(1.9)$^{F}_{S}$	(1.9)^{S}	(2.0)$^{F}_{S}$	(2.1)$^{J}_{S}$	2.1	2.2^{F}	2.2	2.4	2.3	2.3	2.0	2.1	2.1	2.1	(2.2)$^{J}_{S}$	(2.2)$^{J}_{S}$	2.2	2.3	2.2	(2.2)$^{F}_{S}$	(2.2)$^{J}_{S}$	(2.1)$^{J}_{S}$
20	2.1^{F}	2.0^{F}	2.1^{F}	(2.3)$^{F}_{S}$	2.2^{F}	2.0^{F}	2.1^{F}	2.2^{F}	2.3	2.5	(2.4)^{S}	2.3	(2.3)^{Z}	2.0	2.2	(2.2)^{S}	2.2	(2.4)$^{J}_{S}$	2.1	2.2^{F}	2.2	2.0^{F}	2.1^{F}	(1.9)^{S}
21	1.9	1.7	2.0	1.8	(2.0)$^{J}_{S}$	(1.7)^{F}	(1.8)^{F}	(1.9)$^{S}_{F}$	2.5^{F}	2.5	(2.3)$^{J}_{S}$	2.3	2.1	2.0	2.2	^{P}(2.2)$^{S}_{C}$	2.3	2.3	2.3	2.1	(2.1)$^{F}_{S}$	2.0	2.2	2.3
22	2.0	(2.0)^{F}	2.1^{F}	(2.2)$^{F}_{S}$	2.0^{F}	1.9^{F}	1.8^{F}	2.0^{F}	2.5	2.5	2.3	2.1	2.1	C	2.0	2.1	2.2	2.3	(2.2)^{S}	(2.2)$^{J}_{S}$	(2.2)$^{J}_{S}$	(2.1)^{F}	(2.0)$^{F}_{S}$	(2.0)$^{F}_{S}$
23	(2.0)$^{F}_{S}$	(2.0)$^{F}_{S}$	^{S}(2.0)$^{F}_{J}$	^{S}(2.0)$^{J}_{F}$	(2.0)$^{F}_{S}$	(2.1)^{F}	2.1^{F}	^{S}(2.1)$^{J}_{F}$	2.4	2.4^{F}	2.4	2.4	2.2	2.1^{H}	2.1	2.1	(2.3)^{S}	(2.5)^{S}	2.1	2.3	(2.1)^{S}	(1.8)$^{F}_{S}$	2.0	2.0
24	^{S}(1.8)$^{J}_{F}$	(1.7)^{F}	(1.8)^{F}	(1.8)^{F}	(1.9)^{S}	(2.0)$^{F}_{S}$	(1.9)^{F}	2.0^{F}	(2.3)^{F}	2.4	(2.3)^{S}	2.1	2.1	2.0	2.0	2.0	(2.2)^{S}	^{P}(2.2)$^{S}_{C}$	2.1	2.1	2.2^{F}	2.0^{F}	2.1	2.0
25	1.9	1.8^{F}	1.9	1.8	1.9	1.8	2.0	1.9	2.3	2.4	2.2	2.0	2.0	1.9	2.1	(2.1)^{S}	(2.1)$^{S}_{P}$	^{P}(2.1)$^{S}_{C}$	2.0	2.0	2.0	1.9	2.0	(2.1)$^{J}_{S}$
26	(2.0)$^{F}_{S}$	(1.9)^{F}	(1.9)$^{F}_{S}$	2.0^{F}	1.9^{F}	1.9^{F}	(2.0)$^{F}_{S}$	2.1^{F}	2.3	2.4	2.4	2.2	2.2	2.2	(2.2)^{S}	1.9	2.1	(2.2)^{S}	(2.0)^{S}	2.4	2.1^{F}	2.1	(1.9)$^{F}_{S}$	1.9^{F}
27	1.9^{F}	1.7$^{F}_{S}$	1.8	1.6	2.0^{F}	2.0	2.0	(2.0)$^{F}_{S}$	2.3	2.5	(2.5)^{S}	(2.2)$^{J}_{S}$	2.2	2.2	2.0	^{P}(2.1)$^{S}_{C}$	(2.1)$^{S}_{C}$	^{P}(2.2)$^{S}_{C}$	2.3	2.2	2.3	2.0	1.8	2.0
28	1.8	(1.9)^{C}	(1.9)^{F}	2.0^{F}	2.0	2.0^{F}	2.1^{F}	2.0	2.3	2.5	(2.3)$^{S}_{C}$	C	2.2	2.2	2.1	2.1	(2.2)$^{S}_{C}$	^{C}(2.3)$^{J}_{S}$	2.1	(2.2)$^{J}_{C}$	(2.3)$^{J}_{C}$	C	1.8	(2.0)^{C}
29	2.0	1.9^{F}	1.9	1.9	2.0	(1.9)^{S}	(2.0)$^{F}_{S}$	1.9^{F}	2.3	2.5	2.4	2.2	2.2	2.2	2.2	(2.1)^{J}	(2.4)^{J}	(2.3)^{P}	2.0	2.2	2.2	2.0	2.0	2.0
30	2.1	2.0^{F}	2.0	1.9	2.0	2.0	2.1	1.9	2.4	2.3	2.3	(2.2)^{P}	2.1	2.1	2.0	(2.0)^{J}	(2.1)$^{J}_{P}$	S	(2.1)^{P}	2.0	1.8	1.8	(2.2)$^{J}_{F}$	(1.8)^{F}
31	2.0	2.0	2.0	1.9^{F}	2.0^{F}	F	1.6^{F}	2.0^{F}	2.4	2.3	(2.3)$^{J}_{S}$	(2.0)^{S}	2.0	2.1	(2.1)^{S}	2.1	2.2	(2.1)^{S}	2.1^{F}	2.1	^{S}(2.1)$^{J}_{F}$	2.0$^{F}_{S}$	2.0^{F}	S^{F}
Median	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.4	2.3	2.2	2.2	2.1	2.1	(2.1)	2.2	(2.2)	2.1	2.2	2.2	2.0	2.0	(2.0)
Count	31	30	31	31	31	30	31	31	31	31	31	30	31	30	30	30	30	29	30	30	30	30	31	29

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1946 O - 702519

Form adopted June 1946

TABLE 38

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

IONOSPHERIC DATA

F2-M3000 (Characteristic), ______ (Unit), December (Month), 1948

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by E.J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	3.0	3.0	3.1V	3.0V	2.8	(2.9)JS	3.1	3.3	3.5	3.2	3.4	3.3	3.2	(3.3)JF	3.3	(3.4)SC	3.3	P(3.4)SC	(3.2)JS	(3.2)S	3.4	3.1	2.9	2.9
2	2.9	2.9	3.1	3.1	2.9	3.1	(2.8)S	3.2	3.6	3.3	3.3	(3.1)SF	3.3	3.2	P(3.2)SC	P(3.2)SC	(3.4)SC	C	C	C	C	3.0	3.0	(2.9)JF
3	3.0	2.9	2.9	2.9	2.9	3.0F	3.1	3.1	3.5	3.3	3.3	3.3	3.3	(3.3)S	3.0	(3.4)F	C	3.2	3.2	3.3	3.2	3.1	(3.2)JS	(3.1)JS
4	3.2	3.2F	(3.1)F	3.1F	(3.2)F	(3.0)F	(3.0)F	3.2	3.6	(3.6)SC	3.3	3.3	3.1	3.2	3.2	3.2	3.4	3.4	3.2	3.3F	3.3	(3.2)JS	(2.8)S	(3.0)JS
5	2.9	2.9	2.9	3.1	3.1	3.0F	(2.9)FS	3.2	3.5	3.6	3.5	3.3	3.2	3.3	3.2	(3.3)S	3.3	3.4	F(3.3)JS	(3.3)JS	(3.2)JS	3.0	3.1	(3.0)JF
6	F(3.1)JS	S(2.7)JF	(2.6)FS	(2.7)FV	(2.9)FS	(3.0)FS	3.0	3.1	3.4	3.4	(3.2)S	3.2	(3.1)C	(3.2)C	(3.2)SC	S C	(3.2)SF	P(3.2)SC	(3.0)JS	3.1	(3.0)SC	2.9	2.8	(3.0)JS
7	2.9	(2.8)S	3.1	3.3F	(3.2)FS	3.0	(3.1)JS	3.1	3.4	3.6	3.4	3.3	3.3	3.1	(3.1)P	3.1	3.1	(3.3)P	(3.2)P	3.2	3.0	2.8F	(3.4)S	3.0F
8	2.8F	2.9F	3.0F	2.7F	2.9F	2.9F	2.8	3.3	3.4	3.5	(3.5)P	3.2	3.2	3.1	3.2	3.4	3.3	3.2	(3.2)JS	3.3	(3.2)S	(3.5)JS	S(3.2)JF	(3.0)JS
9	3.0	2.9F	2.9F	3.1F	3.3F	2.9F	3.0F	3.0	3.4	3.5	3.4	3.3	3.2	3.0	3.2	(3.1)SC	(3.5)PS	(3.4)SC	3.2	3.0	3.2	(2.9)FC	2.7F	2.8F
10	(2.8)JS	(2.8)F	3.0	3.1	2.8	2.9	3.1F	3.2F	3.4	3.2	(3.1)SC	3.2	3.2	3.2	3.4	(3.1)SC	C(3.2)JS	(3.0)S	3.1	(3.2)JS	3.1	2.8	2.9	(2.9)S
11	3.2	(3.0)S	3.0	3.0	2.8	(3.0)S	3.2	3.2	3.6	3.4	3.3	(3.3)S	3.2	3.1	(3.0)S	P(3.3)SC	3.2	P(3.3)SC	3.2	3.4	3.2	3.1	(2.9)JS	3.1
12	3.2F	(2.7)F	(2.7)F	(2.8)F	(2.9)F	(3.1)F	3.2F	3.0	3.2	3.5	3.4	3.3	3.2	(3.2)S	3.2	3.2	3.4	3.3	3.1	3.3	3.3	3.0	2.9	2.8
13	2.9F	2.9F	2.7F	3.1F	(2.9)FS	2.9	(3.1)F	3.1	(3.5)S	3.4	3.5	3.3	(3.5)JS	3.2	3.1	3.2	3.1	3.1	3.1	(3.0)J	2.9	2.9	2.9	2.8F
14	2.7F	2.4	2.7	3.1F	3.0F	(3.4)FS	2.7F	3.0F	3.5	(3.3)C	3.1	3.1	(3.0)P	3.0	3.1	3.1	3.0	(3.4)S	(3.2)S	(3.5)J	(3.0)J	3.0	3.0	3.2
15	3.1	2.9F	3.0F	2.8F	3.0F	3.2F	3.1F	2.8F	3.5	3.4	3.3	3.2	(3.0)J	3.2	3.1	(3.1)J	(3.3)J	2.9	3.3	3.2	(3.4)J	(3.1)J	(3.1)J	S(3.0)JF
16	3.0F	F S	(2.9)S	(3.1)F	3.1	2.7	2.9	3.4	3.4	3.2	3.3	3.0	(3.1)S	3.1	[3.0]C	3.0	(3.5)FS	C(3.4)JS	3.2	3.1	3.2	2.9	2.9	2.8
17	(2.8)FS	(3.1)S	3.0	3.1	(2.9)S	2.9F	2.9	3.4	3.4	3.4	3.1	3.2	3.3	3.3	3.0	(3.3)SC	C(3.3)JS	(3.3)SC	3.2	3.2	3.3	(3.1)JS	2.8	(2.9)JS
18	2.9	2.8	2.8	2.9	(2.9)JS	3.0	2.9	3.0	3.5	3.4	3.4	3.2	[3.2]	3.1	(3.1)SC	(3.2)SC	3.0	3.3	3.5	(3.4)S	3.1	3.1	2.9	C
19	(3.0)F	2.8F	(2.8)FS	(2.8)S	(3.0)FS	(3.1)JS	3.1	3.3F	3.4	3.5	3.4	3.4	3.0	3.1	3.1	3.1	(3.3)JS	(3.2)JS	3.2	3.3	3.3	(3.3)FS	(3.2)JS	(3.1)JS
20	3.1F	3.0F	3.0F	(3.2)FS	3.2F	3.0F	3.1F	3.1F	3.5	3.5	(3.4)S	3.3	(3.2)J	3.1	3.2	(3.3)S	3.3	(3.5)JS	3.2	3.2F	3.1	3.0	3.1F	(2.8)S
21	2.7	2.7	3.1	2.7	(3.0)JS	(2.5)F	(2.7)F	(2.9)FS	3.6F	3.6	(3.3)JS	3.3	3.1	3.0	3.1	P(3.1)SC	3.2	3.4	3.3	3.1	(3.2)FS	3.1	3.3	3.4
22	3.1	(3.0)F	3.2F	(3.1)FS	2.9F	2.8F	2.8F	3.0F	3.6	3.5	3.4	3.2	3.2	C	3.0	3.1	3.2	3.3	(3.0)S	(3.3)JS	(3.1)JS	(3.2)F	(3.0)FS	(3.0)JS
23	(2.9)FS	(2.9)JS	S(2.9)JF	S(3.0)JF	(2.9)FS	(3.0)F	3.0F	S(3.1)JF	3.5	3.4F	3.5	3.5	3.2	3.1H	3.1	3.1	(3.3)S	(3.3)S	3.1	3.3	(3.2)S	(3.0)FS	3.1	3.0
24	S(2.8)JF	(2.7)F	(2.7)F	(2.7)F	(2.8)S	(2.9)FS	(2.9)F	3.0F	3.3F	3.4	(3.3)S	3.1	3.1	2.9	3.0	3.0	(3.2)S	P(3.2)SC	3.2	3.2	3.2F	3.0F	3.0	3.0
25	2.9	2.8F	2.8	2.8	2.9	2.8	3.0	2.9	3.4	3.4	3.2	2.9	3.0	2.9	3.0	(3.0)S	(3.0)FP	P(3.1)SC	3.0	2.9	3.0	2.9	3.0	(3.0)JS
26	(3.0)FS	(3.1)F	(2.9)FS	2.9F	2.8F	2.8F	(3.0)FS	3.1F	3.3	3.5	3.4	3.2	3.2	3.2	(3.2)S	2.9	3.0	(3.2)S	(3.0)S	3.5	3.1F	3.1	(2.9)FS	2.9F
27	2.8F	2.5FS	2.7	2.7	3.0F	3.0	3.0	(2.9)FS	3.3	3.6	(3.5)S	(3.3)JS	3.2	3.2	2.9	P(3.0)SC	(3.1)SC	P(3.3)SC	3.2	3.2	3.4	3.0	2.8	2.9
28	2.8	(2.7)C	(2.8)F	2.9F	2.9	2.9F	3.1F	2.9	3.4	3.5	(3.4)SC	C	3.3	3.2	3.1	3.1	(3.3)SC	C(3.3)JS	3.2	(3.3)JC	(3.4)JC	C	2.8	(2.9)C
29	3.1	2.9F	2.9	2.9	3.0	(2.9)S	(2.9)FS	2.8F	3.4	3.4	3.4	3.3	3.2	3.1	3.2	(3.2)J	(3.4)J	(3.4)P	3.0	3.3	3.2	3.0	3.0	3.0
30	3.0	3.0F	3.0	3.0	3.0	3.0	3.2	2.9	3.5	3.2	3.3	(3.2)P	3.1	3.0	3.0	(3.0)J	(3.1)JP	S	(3.1)P	3.0	2.6	2.7	(3.2)JF	(2.8)F
31	2.9	3.0	3.0	2.8F	3.0F	F	2.5F	3.0F	3.5	3.4	(3.2)JS	(3.0)S	3.0	3.0	(3.0)S	3.0	3.1	(3.2)S	3.1F	3.2	S(3.2)JF	3.0FS	3.0F	S F
Median	2.9	2.9	2.9	3.0	2.9	3.0	3.0	3.1	3.5	3.4	3.4	3.2	3.2	3.1	3.1	(3.1)	3.2	(3.3)	3.2	3.2	3.2	3.0	3.0	(3.0)
Count	31	30	31	31	31	30	31	31	31	31	31	30	31	30	31	30	30	29	30	30	30	30	31	29

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

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U. S. GOVERNMENT PRINTING OFFICE 1948 O - 703513

TABLE 39

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D.C.

IONOSPHERIC DATA

Form adopted June 1946

FI-M3000 (Characteristic), ____ (Unit), December (Month), 1948

Observed at Washington, D.C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

National Bureau of Standards (Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: J.J.S., A.C.K.,

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1												L	Q	L	L	Q	Q									
2										Q			L	Q	Q			C								
3																	C									
4											L^H	L	L	L												
5											L	Q		L^H	L											
6										Q	L	Q	Q													
7														L	Q	Q	Q									
8										Q	L	Q	L	Q	L	Q										
9																										
10																										
11												L	L													
12											L	L	L	Q		L										
13											L	Q	Q	L	L	L	Q									
14														L												
15																										
16																										
17													L	(L)^C												
18												L	L													
19											L	L				L										
20											L															
21													L	L												
22											L			L	L	L										
23											L			L												
24																										
25																										
26											L		L													
27																										
28											L															
29											L															
30														L	L											
31													L	L	L											
Median																										
Count																										

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1946 O - 702510

TABLE 40

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Form adopted June 1946

E-M1500 (Characteristic) . _____ (Unit) December (Month), 1948

IONOSPHERIC DATA

National Bureau of Standards (Institution)

Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

75°W Mean Time

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: A.C.K., J.J.S.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									(4.5)H	3.9H	4.0	4.1	4.2	4.1	4.3	4.4	(4.5)A							
2									(4.1)H	4.1	A	A	4.2	A	4.5	A	4.5	C						
3									4.2	B	B	B	B	A	A	A	C							
4									(4.4)H	(4.0)C	(4.1)H	4.2	(4.0)H	4.4	4.5	4.1	4.2							
5									3.8H	3.9H	3.9H	(4.1)AF	4.5	(3.9)H	(4.1)H	(4.4)A	(4.1)H							
6									4.0H	4.4	4.5	4.6	A	AC	A	A	4.4	A						
7									3.9	4.4	4.3	4.2H	(4.4)C	4.3	4.2	4.5	4.6							
8									A	(4.0)A	4.4	A	4.3	4.3	(4.4)C	A	(4.1)SC							
9								3.7	(4.2)H	(4.4)AH	4.3	4.2	4.7	4.6H	4.5	(4.5)S	A							
10									(3.9)H	4.4	4.2	4.2	4.2	4.5	(4.4)C	A	4.1	(3.8)S						
11									4.5	(4.2)SC	(4.2)H	(4.2)C	4.5	4.5	A	(4.1)C	(4.0)S							
12									(4.1)S	(4.3)S	4.5	(4.4)S	(4.4)SC	4.5	(4.5)SC	(4.4)SC	A							
13									(3.8)HF	4.4	(4.4)C	4.4	4.3	4.3	4.5	(4.7)S	A							
14									A	4.6	4.1	4.3	(4.1)B	C	4.1	4.3	4.5	C						
15									4.0	A	4.7	4.6	4.5	4.2	4.6	4.4	4.3							
16									4.3	(4.4)H	4.2	4.2	(4.4)SC	4.5	C	(3.8)H	(4.3)C							
17									3.9H	4.3	(4.2)H	(4.5)H	(4.5)C	(4.5)AC	C	A	3.9							
18									(3.7)H	(4.5)A	4.4	4.4	4.2	(4.4)S	4.5	(4.5)A	4.4H	4.3H						
19									(4.1)H	(4.4)S	4.2	4.4	4.4	4.6	4.5	(4.4)C	(4.3)H							
20									4.1H	A	(4.4)A	4.3	(4.3)C	4.3	4.6	C	4.3	3.9						
21									4.1	(4.5)H	(4.5)H	4.5	(4.3)F	(4.3)F	4.7	4.2	4.4							
22									A	4.4	(4.2)H	(4.4)F	4.4	C	4.5	4.4	A							
23									A	4.3	(4.0)A	A	4.5	4.5	4.7	(4.6)A	S							
24									3.9H	4.5	4.4F	A	B	(4.3)SC	4.2	A	A							
25									4.3	4.4H	4.3	4.2	4.4	4.5F	A	4.6	(4.4)A							
26									A	S	4.4	4.4	4.2	4.5	4.4M	4.4	4.3							
27									(3.6)H	4.1	4.1	4.2	4.1	4.3	4.6	4.5	4.5							
28									4.0	4.0	4.3	C	4.5	4.5	(3.9)C	C	4.1							
29									A	(4.3)SC	4.3	4.5	(4.5)C	4.2	4.2	A	B							
30									4.0H	C	4.0	B	(4.3)C	4.6	(4.5)C	B	B							
31									3.9H	(3.9)S	A	4.2	3.9	4.1	4.5	B	B							
Median									4.0	4.4	4.3	4.3	4.4	4.4	4.5	4.4	4.3							
Count									25	26	28	24	23	26	25	19	21							

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

U. S. GOVERNMENT PRINTING OFFICE 1948 O - 703519

Table 41

Ionospheric Storminess at Washington, D. C.

December 1948

Day	Ionospheric character* 00-12 GCT	Ionospheric character* 12-24 GCT	Principal storms Beginning GCT	Principal storms End GCT	Geomagnetic character** 00-12 GCT	Geomagnetic character** 12-24 GCT
1	2	2			1	1
2	1	2			2	1
3	2	2			3	0
4	1	2			1	1
5	1	3			2	1
6	3	2			3	4
7	2	2			4	3
8	3	2			2	2
9	2	2			2	1
10	2	2			1	2
11	1	2			3	2
12	3	2			1	0
13	3	2			1	3
14	2	2			4	3
15	2	2			2	2
16	1	2			2	3
17	2	1			2	1
18	2	2			2	1
19	2	2			2	1
20	2	1			1	2
21	2	1			3	3
22	1	1			3	1
23	2	2			1	2
24	3	1			3	2
25	1	1			3	4
26	2	1			2	1
27	3	1			2	2
28	3	1			0	1
29	2	1			2	2
30	2	1			2	4
31	2	2			4	3

*Ionosphere character figure (I-figure) for ionospheric storminess at Washington, D. C., during 12-hour period, on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

**Average for 12 hours of Cheltenham, Maryland, geomagnetic K-figures on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

Table 42

Sudden Ionosphere Disturbances Observed at Washington, D. C.

December 1948

Day	GCT		Location of transmitters	Relative intensity at minimum*	Other phenomena
	Beginning	End			
7	1353	1405	Ohio, D.C., England, Mexico	0.3	
8	1654	1705	Ohio, D.C.	0.1	
9	1145	1225	England	0.0	
20	1725	1800	Ohio, D.C., England	0.05	
23	1212	1305	Ohio, England	0.0	Terr.mag.pulse** 1211-1225 Solar flare*** 1210
24	1634	1805	Ohio, D.C., England, New Brunswick	0.0	
27	1426	1435	Ohio, D.C., England	0.2	
27	1710	1805	Ohio, D.C., England, New Brunswick	0.0	
30	1556	1705	Ohio, D.C., England, New Brunswick	0.0	Terr.mag.pulse** 1558-1635

*Ratio of received field intensity during SID to average field intensity before and after, for station W8XAL, 6080 kilocycles, 600 kilometers distant, for all SID except the following: Station GLH, 13525 kilocycles, 5800 kilometers distant, was used for the SID on December 9 and 23.

**As observed on Cheltenham magnetogram of the United States Coast and Geodetic Survey.

***Time of observation at Greenwich Observatory, England.

Table 43

Sudden Ionosphere Disturbances Reported by

RCA Communications, Inc., as Observed

at Point Reyes, California

1948 Day	GCT		Location of transmitters
	Beginning	End	
December 22-23	2355	0030	Australia, China, Hawaii, Japan, Philippine Is.
24	2155	2300	Australia, Java
26	0200	0230	Australia, China, Japan, Java, Philippine Is.

Table 44

Sudden Ionosphere Disturbances Reported by Engineer-in-Chief,

Cable and Wireless, Ltd., as Observed in England

1948 Day	GCT Beginning	GCT End	Receiving station	Location of transmitters
December 9	1145	1215	Brentwood	Austria, Bahrein I., Belgian Congo, Bulgaria, Canary Is., Chili, Colombia, Greece, India, Iran, Kenya, Malta, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Switzerland, Turkey, Uruguay, U.S.S.R., Yugoslavia, Zanzibar
9	1152	1210	Somerton	Aden, Argentina, Ascension I., Austria, Brazil, Canada, Ceylon, China, Egypt, Gold Coast, India, Malay States, New York, Union of S. Africa
11	0822	0840	Brentwood	Austria, Bahrein I., Belgian Congo, Canary Is., Eritrea, French Equatorial Africa, Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Trans-Jordan, Turkey, Yugoslavia, Zanzibar
11	0822	0840	Somerton	Aden, Ascension I., Ceylon, Egypt, Gold Coast, India, Union of S. Africa

Table 45

Sudden Ionosphere Disturbances Reported by

International Telephone and Telegraph Corporation,

as Observed at Platanos, Argentina

1948 Day	GCT Beginning	GCT End	Location of transmitters
October 11	1220	1410	Bolivia, Brazil, Denmark, England, New York, Peru, Switzerland, Venezuela
21	1400	1430	Bolivia, Brazil, Chile, Colombia, Denmark, England, France, Germany, New York, Peru, Switzerland, Venezuela
November 13	1651	1710	Bolivia, Brazil, Chile, Denmark, England, Germany, Netherlands, New York, Peru, Spain, Venezuela
18	1840	1905	Bolivia, Brazil, Chile, Denmark, England, France, Germany, New York, Peru, Spain, Venezuela
22	1353	1445	Bolivia, Brazil, Colombia, England, Germany, New York, Peru, Switzerland, Venezuela

Note: Observers are invited to send to the CRPL information on times of beginning and end of sudden ionosphere disturbances for publication as above. Address letters to the Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Table 46

Provisional Radio Propagation Quality Figures
(Including Comparisons with CRPL Warnings and CRPL Probable Disturbed Period Forecasts)
November 1948

Day	North Atlantic Quality figure 01-12 GCT	North Atlantic Quality figure 13-24 GCT	North Atlantic CRPL* Warning 01-12 GCT	North Atlantic CRPL* Warning 13-24 GCT	North Atlantic CRPL** Forecast of probable disturbed periods	North Atlantic Geomagnetic K_{Ch} 01-12 GCT	North Atlantic Geomagnetic K_{Ch} 13-24 GCT	North Pacific Quality figure 01-12 GCT	North Pacific Quality figure 13-24 GCT	North Pacific CRPL* Warning 01-12 GCT	North Pacific CRPL* Warning 13-24 GCT	North Pacific CRPL** Forecast of probable disturbed periods	North Pacific Geomagnetic K_{Ch} 01-12 GCT	North Pacific Geomagnetic K_{Ch} 13-24 GCT
1	5	6				1	3	7	7				1	3
2	(4)	(4)	X	X		5	3	6	6	X	X		5	3
3	(4)	5	X			3	2	6	7	X			3	2
4	5	6				0	0	7	7				0	0
5	6	7				1	1	7	6				1	1
6	7	7				1	1	7	7				1	1
7	6	7				3	2	8	7				3	2
8	6	7				3	3	7	7				3	3
9	6	7				3	3	7	7				3	3
10	7	7	X			2	1	6	7	X			2	1
11	6	7				2	1	6	7				2	1
12	6	7				0	0	6	7				0	0
13	7	7				0	2	6	7				0	2
14	6	7				1	1	7	8				1	1
15	7	7				2	3	7	7				2	3
16	7	7				3	2	7	6				3	2
17	6	5			X	3	3	7	6			X	3	3
18	5	6	X	X	X	3	3	7	6	X	X	X	3	3
19	6	6	X	X	X	4	2	6	6	X	X	X	4	2
20	5	5	X	X		4	4	6	5	X	X		4	4
21	(4)	6	X	X	X	5	3	6	6	X	X	X	5	3
22	5	6	X	X	X	4	3	6	5	X	X	X	4	3
23	6	5	X	X		3	2	6	5	X	X		3	2
24	6	5				3	3	7	6				3	3
25	5	6	X			3	3	5	(4)	X			3	3
26	5	6				2	3	6	7				2	3
27	6	6				3	2	6	6				3	2
28	6	6				3	2	6	5				3	2
29	6	6			X	2	1	7	6			X	2	1
30	7	7			X	1	0	6	5			X	1	0
Score:														
H			3		1					1		0		
M			0		2					0		1		
G			20		21					20		22		
(S)			5		3					3		2		
S			2		3					6		5		

*Broadcast on WWV, Washington, D.C. Times of warnings recorded to nearest half day as broadcast.

**In addition to dates marked X, the following were designated as probable disturbed days on forecasts more than eight days in advance of said dates: November 14 and 15.

Quality Figure Scale:
1 - Useless
2 - Very poor
3 - Poor
4 - Poor to fair
5 - Fair
6 - Fair to good
7 - Good
8 - Very good
9 - Excellent

Symbols:
- X Warning given or probable disturbed date
- H Quality 4 or worse on day or half day of warning
- M Quality 4 or worse on day or half day of no warning
- G Quality 5 or better on day of no warning
- (S) Quality 5 on day of warning
- S Quality 6 or better on day of warning
- ( ) Quality 4 or worse (disturbed)

Geomagnetic K_{Ch} on the standard scale of 0 to 9, 9 representing the greatest disturbance

Table 47a

Coronal observations at Climax, Colorado (5303A), east limb

Date	Degrees north of the solar equator																		0°	Degrees south of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	-	-	-	-	-	-	15	17	17	20	34	18	18	17	22	30	27	15	11	10	10	7	8	7	4	3	-	-	-	-	-	+15
Dec. 2.8	-	-	-	2	3	3	3	3	2	-	-	4	8	10	25	30	30	25	14	13	18	24	23	12	10	8	6	5	4	3	2	-	-	X	X	X	X	+15
3.7	-	-	2	2	3	3	3	3	4	4	4	5	9	20	23	28	27	16	13	14	16	37	24	20	14	12	10	9	8	9	5	4	4	-	-	-	-	+15
9.8	-	-	-	-	-	-	2	3	10	9	9	5	12	13	14	15	17	19	20	22	16	14	11	12	13	11	9	7	6	5	4	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	-	-	-	3	3	3	10	11	12	20	30	22	14	13	14	17	20	14	7	5	4	4	3	-	-	-	-	-	-	-	-	+10
14.7	-	-	-	-	-	-	-	-	-	3	3	3	7	12	16	20	29	27	16	14	17	15	14	11	8	7	7	8	8	7	5	3	3	3	2	-	-	+10
27.8	-	-	-	-	-	-	-	-	-	-	-	-	-	5	12	22	33	32	16	15	16	18	26	18	12	12	10	9	9	8	7	5	4	3	3	2	-	+ 5
29.7	-	-	-	3	3	3	3	3	3	-	-	-	8	11	22	21	15	12	10	9	15	32	23	16	13	13	9	9	9	8	4	3	2	-	-	-	-	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	5	5	9	9	8	9	5	4	10	13	22	26	20	10	9	8	8	7	5	4	4	3	-	-	X	X	+ 5

Table 48a

Coronal observations at Climax, Colorado (6374A), east limb

Date	Degrees north of the solar equator																		0°	Degrees south of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	-	-	-	-	-	3	4	1	1	-	-	1	2	7	8	10	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
Dec. 2.8	-	-	-	-	-	-	-	-	-	-	1	3	2	2	1	-	9	8	7	7	8	9	7	-	-	-	-	-	-	-	-	-	-	X	X	X	X	+15
3.7	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	4	4	3	2	3	14	5	4	3	-	-	-	-	-	-	-	-	-	1	1	1	1	+15
9.8	-	-	-	-	-	-	-	-	-	-	1	5	10	1	1	1	4	2	-	6	8	12	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	3	8	10	-	-	1	10	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
14.7	-	1	1	1	1	1	1	1	-	-	-	-	-	1	1	14	7	13	-	-	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
27.8	-	-	-	-	-	-	-	-	-	1	2	2	2	3	1	2	12	18	3	1	11	10	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+ 5
29.7	3	2	2	1	-	-	-	-	-	1	1	1	3	7	2	3	3	3	7	8	8	10	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	1	2	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	X	X	+ 5

Table 49a

Coronal observations at Climax, Colorado (6704A), east limb

Date	Degrees north of the solar equator																		0°	Degrees south of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
Dec. 2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	3	2	1	1	2	2	2	1	-	-	-	-	-	-	-	-	-	X	X	X	X	+15
3.7	-	-	1	1	2	2	2	3	1	1	2	2	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
27.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	3	3	2	2	2	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	+ 5
29.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	1	1	2	2	1	1	-	-	-	-	-	-	-	-	-	-	X	X	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	1	1	2	3	3	1	-	-	-	-	-	-	-	-	-	-	-	X	X	+ 5

Table 47b

Coronal observations at Climax, Colorado (5303A), west limb

Date	Degrees south of the solar equator																		0°	Degrees north of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	4	5	5	4	0	8	10	10	15	17	32	28	19	23	28	24	27	27	20	11	10	9	7	-	-	-	-	-	-	-	-	+15
Dec. 2.8	X	X	X	X	X	X	3	3	4	5	8	10	15	17	14	13	13	11	12	14	25	25	20	17	14	12	8	6	4	3	-	-	-	-	-	-	-	+15
3.7	-	-	-	-	2	4	5	3	3	5	11	12	12	14	13	9	10	10	10	21	22	21	17	12	12	11	9	5	3	2	-	-	-	-	-	-	-	+15
9.8	-	-	-	-	-	3	3	7	8	10	12	12	11	30	32	22	20	15	13	11	11	11	10	9	9	-	-	-	-	-	-	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	4	8	10	10	0	9	11	11	11	25	34	25	22	17	18	19	23	11	10	5	-	-	-	-	-	-	-	-	-	-	-	+10
14.7	-	-	-	-	-	3	3	9	11	11	9	9	13	11	12	30	38	23	18	16	17	33	36	16	17	13	3	-	3	3	3	3	3	3	3	-	-	+10
27.8	-	-	-	-	-	3	3	4	5	5	9	10	12	18	37	37	25	21	20	20	20	25	35	34	20	15	11	10	12	12	-	-	X	X	X	X	-	+ 5
29.7	-	-	-	-	-	-	-	-	-	2	3	5	5	12	14	13	10	8	8	9	10	10	12	11	10	4	3	2	-	-	-	-	-	-	-	-	-	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	-	-	7	8	8	9	9	8	9	10	10	8	8	8	9	9	8	X	X	X	X	X	X	X	X	X	+ 5

Table 48b

Coronal observations at Climax, Colorado (6374A), west limb

Date	Degrees south of the solar equator																		0°	Degrees north of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	15	8	-	-	2	7	1	-	1	-	1	1	1	1	1	-	-	-	-	-	-	+15
Dec. 2.8	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	7	6	3	4	6	18	23	14	8	4	2	2	3	3	3	4	1	1	-	-	-	-	+15
3.7	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	1	2	3	4	10	12	22	20	11	8	8	3	1	1	1	1	1	-	1	2	1	-	+15
9.8	-	-	-	-	1	1	1	1	1	1	1	1	1	5	8	9	-	-	1	3	4	2	1	1	3	3	2	2	2	2	-	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	4	4	1	-	1	1	1	4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	+10
14.7	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	8	7	-	1	-	2	1	1	1	2	2	2	1	1	-	-	-	-	-	-	-	-	+10
27.8	-	-	-	-	-	-	-	-	-	-	1	1	2	10	10	0	9	9	2	3	22	20	18	17	5	2	1	-	-	1	1	1	X	X	X	X	-	+ 5
29.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	3	6	8	8	5	5	2	-	-	-	1	1	1	1	1	1	1	3	3	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	1	1	-	-	-	1	3	[illegible]	2	-	2	3	-	X	X	X	X	X	X	X	X	X	+ 5

Table 49b

Coronal observations at Climax, Colorado (6704A), west limb

Date	Degrees south of the solar equator																		0°	Degrees north of the solar equator																		P
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5		5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1948																																						
Nov. 30.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
Dec. 2.8	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	+15
3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+15
13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	+10
27.8	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	2	1	-	-	1	2	4	4	2	1	-	-	-	-	-	-	X	X	X	X	-	+ 5
29.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	+ 5
30.9	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	+ 5

Table 50

Particulars of observations, Climax, Colorado
July-December 1948

Date GCT	Green line threshold intensity at						Obs.	Meas.	Date GCT	Green line threshold intensity at						Obs.	Meas.
	45°	90°	135°	225°	270°	315°				45°	90°	135°	225°	270°	315°		
1948									1948								
July 1.6	12	10	9	9	9	8	F	E	Sept. 1.7	7	6	7	6	5	5	F	E
2.6	9	11	9	8	8	7	F	E	2.6a	9	9	9	9	9	8	F	E
4.6	8	8	7	8	8	8	F	E	3.7a	11	11	10	12	11	12	F	E
5.6	7	8	8	8	8	9	F	E	4.8	>15	>15	15	–	–	–	F	E
6.[illegible]	8	[illegible]	8	6	6	–	F	E	5.6	14	12	13	14	12	12	F	E
[illegible]	10	[illegible]	[illegible]	10	10	10	F	E	8.0	13	14	13	–	–	–	F	E
[illegible]	5	[illegible]	7	>15	>[illegible]	15	F	E	9.6	14	12	10	–	–	–	F	E
[illegible]	8	[illegible]	[illegible]	[illegible]	[illegible]	7	F	E	10.7	13	9	11	11	10	9	F	E
10.6	10	[illegible]	3	11	9	8	F	E	11.9	13	15	15	>15	14	14	F	E
11.6	10	9	11	–	–	–	F	E	12.7	>15	>15	>15	>15	>15	>15	F	E
12.7	13	12	11	14	13	15	F	E	20.9a	6	7	5	6	8	6	F	E
13.7	10	10	10	8	[illegible]	10	F	E	21.7a	4	4	5	4	4	5	F	E
14.[illegible]	[illegible]	8	9	9	[illegible]	6	F	E	23.7a	6	6	6	7	6	5	F	E
15.[illegible]	[illegible]	11	11	11	[illegible]	10	F	E	25.7a	12	13	13	–	–	–	F	E
16.7	14	14	13	15	14	13	F	E	Oct. 1.8	11	14	11	–	14	–	F	E
17.6	13	12	10	12	11	12	F	E	2.7	11	11	11	11	10	12	F	E
19.7	8	10	8	11	11	11	F	E	3.7	–	14	>15	–	–	–	F	E
20.9	11	10	12	15	12	13	F	E	7.9	8	12	6	6	7	7	F	E
21.8	10	10	11	8	8	8	F	E	8.6	12	12	11	11	11	12	F	E
22.7	8	9	9	8	8	7	F	E	9.7	7	12	6	5	5	5	F	E
23.6	11	[illegible]	10	9	10	12	F	E	10.6	5	5	5	7	6	5	F	E
24.8	9	9	9	9	10	7	F	E	12.6	6	7	5	5	5	6	F	E
26.0	–	10	–	–	–	–	F	E	13.6	8	6	9	9	11	9	F	E
26.6	11	9	11	11	11	11	F	E	14.6	4	4	4	4	4	3	F	E
28.0	7	10	8	–	–	–	F	E	15.7	–	5	9	9	5	5	F	E
29.9	–	8	12	–	–	–	F	E	17.6	5	7	6	7	8	7	F	E
29.6	10	12	11	12	12	10	F	E	18.6	3	3	3	4	5	4	F	E
30.7	13	10	9	10	13	10	F	E	20.7	6	5	6	5	6	7	F	E
31.7	[illegible]	12	12	9	9	9	F	E	21.9	13	14	>15	>15	>15	12	F	E
Aug. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7	7	F	E	23.8	10	11	9	13	10	10	F	E
[illegible]	13	12	[illegible]	10	10	9	F	E	24.6	4	4	4	4	5	4	F	E
3.6	11	9	10	10	10	13	F	E	25.6	6	6	6	7	7	6	F	E
6.8	–	10	13	–	–	–	F	E	26.8	11	7	8	13	8	10	F	E
8.6	8	7	8	9	9	8	F	E	29.8	13	11	9	9	11	7	F	E
10.9	8	8	8	9	13	13	F	E	31.7	5	6	6	8	7	7	F	E
11.7	8	8	11	9	9	10	F	E	Nov. 1.7	10	7	7	–	11	12	F	E
13.8	4	4	9	–	7	10	F	E	5.8	8	8	9	8	8	10	F	E
15.6	2	2	3	2	2	2	F	E	13.8	7	6	7	8	9	8	F	E
16.8	13	3	7	7	7	10	F	E	14.7	7	7	8	6	7	8	F	E
17.6	5	6	5	5	4	5	F	E	15.6	6	6	6	7	6	6	F	E
18.9	–	3	6	–	–	–	F	E	21.7	8	9	10	10	8	7	F	E
19.7	4	3	3	3	3	3	F	E	28.7	7	6	8	6	6	6	F	E
20.7	6	4	6	7	5	6	F	E	30.8	10	8	9	8	9	9	F	E
22.7	3	3	4	4	3	3	F	E	Dec. 2.8	6	7	7	–	7	7	F	E
24.6	3	5	4	4	4	4	F	E	3.7	3	5	6	4	4	3	F	E
25.6	3	4	4	3	3	3	F	E	9.8	7	7	9	9	6	11	F	E
26.8	5	5	5	8	4	5	F	E	13.7	9	9	10	7	9	9	F	E
27.6	5	5	5	6	6	5	F	E	14.7	4	6	5	5	4	4	F	E
28.6	5	5	4	4	4	5	F	E	27.8	5	5	4	5	4	8	J	E
30.6	4	5	5	4	4	5	F	E	29.7	4	4	4	5	4	3	J	E
31.6	7	5	5	6	6	6	F	E	30.9	–	12	8	–	14	–	J	E

E = J.W. Evans
F = W. Fleming
J = Johnson
a = low weight

Table 51

American and Zürich Provisional Relative Sunspot Numbers

December 1948

Date	R_A*	R_Z**	Date	R_A*	R_Z**
1	86	64	17	232	192
2	81	70	18	286	213
3	103	100	19	289	221
4	108	110	20	280	210
5	92	85	21	250	200
6	134	85	22	204	176
7	148	85	23	218	188
8	144	92	24	220	169
9	142	102	25	215	211
10	121	96	26	193	172
11	116	92	27	191	152
12	162	124	28	189	138
13	162	131	29	203	140
14	169	128	30	153	144
15	230	132	31	129	135
16	239	177	Mean:	177.1	139.8

*Combination of reports from 47 observers; see page 15.

**Dependent on observations at Zürich Observatory and its stations at Locarno and Arosa.

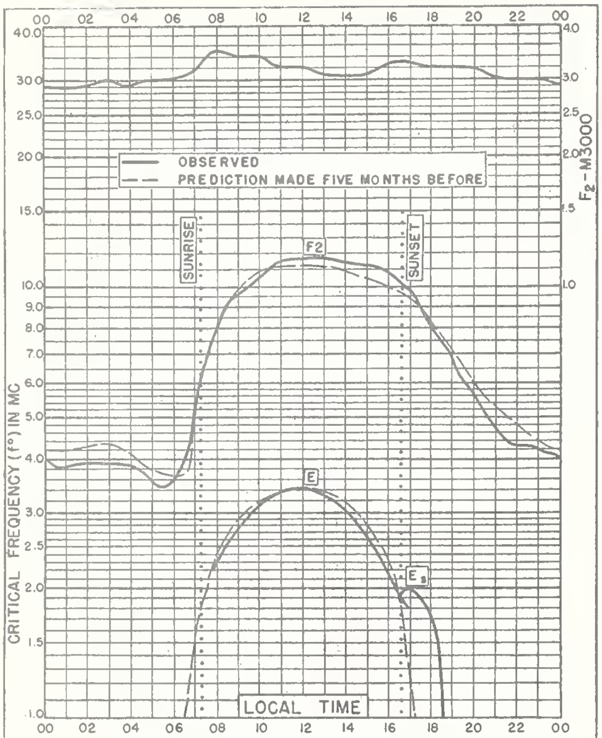


Fig. 1. WASHINGTON, D. C.
39.0°N, 77.5°W DECEMBER 1948

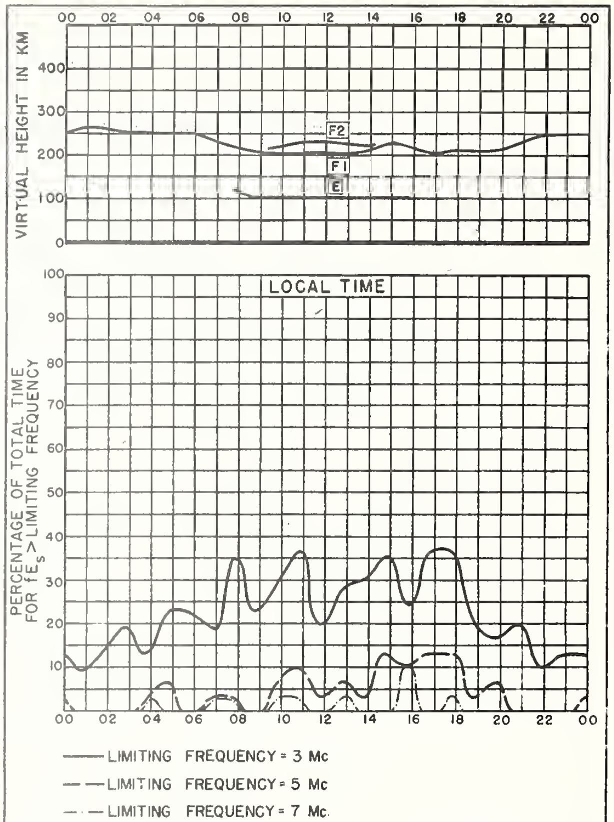


Fig. 2. WASHINGTON, D. C. DECEMBER 1948

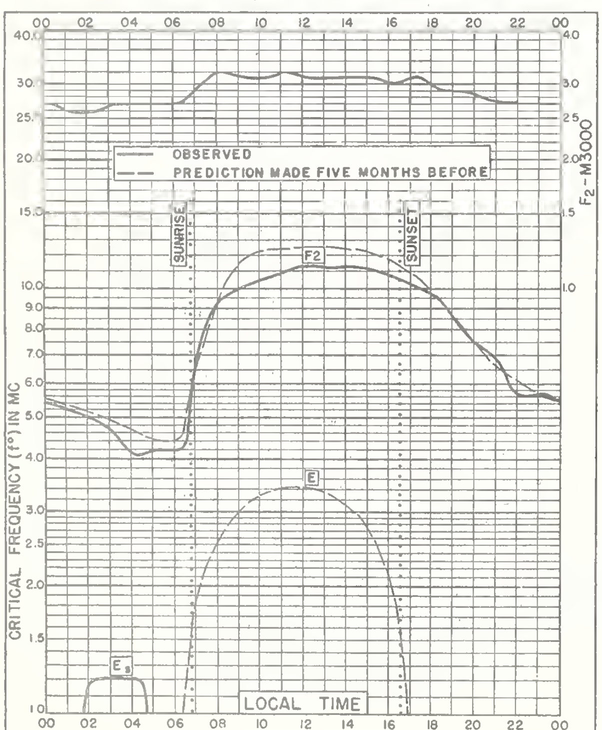


Fig. 3. BOSTON, MASSACHUSETTS
42.4°N, 71.2°W NOVEMBER 1948

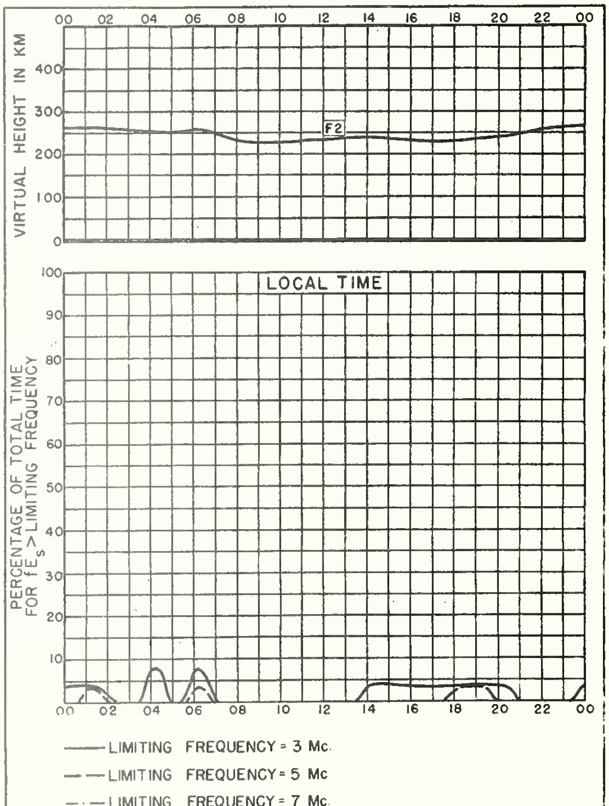


Fig. 4. BOSTON, MASSACHUSETTS NOVEMBER 1948

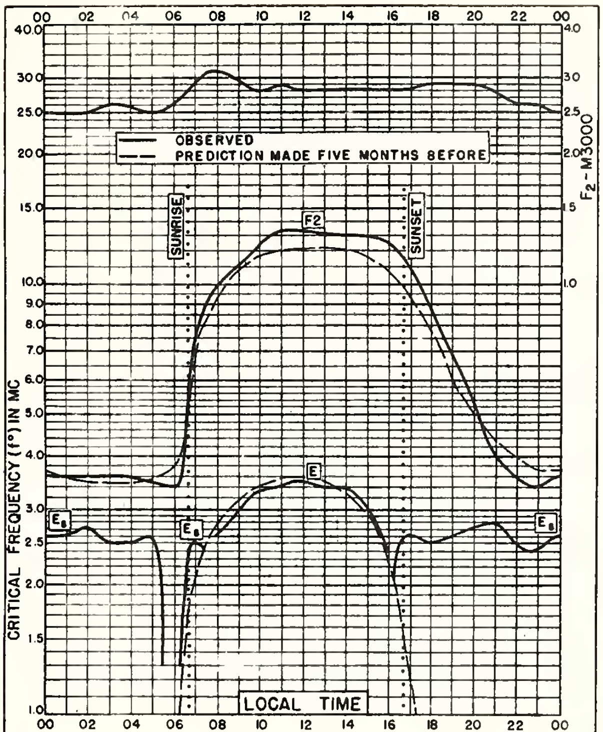


Fig. 5. SAN FRANCISCO, CALIFORNIA
37.4°N, 122.2°W NOVEMBER 1948

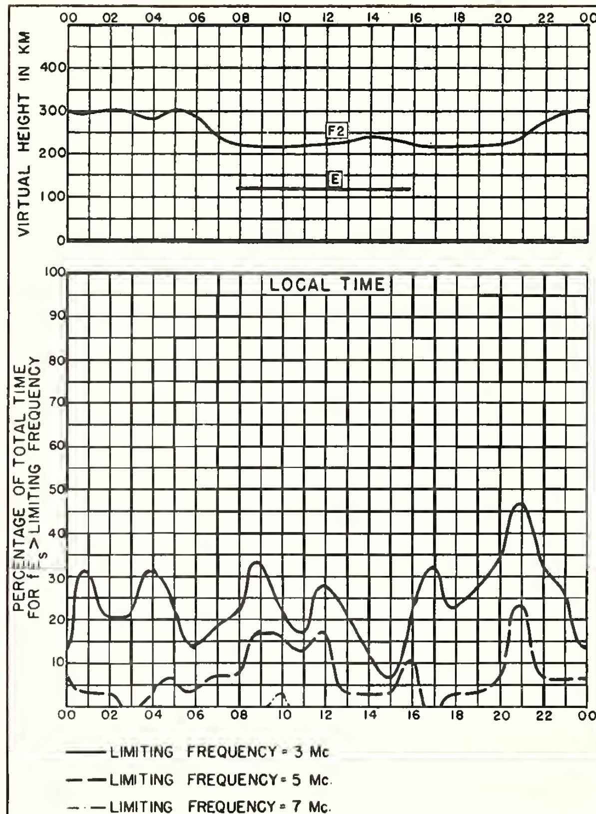


Fig. 6 SAN FRANCISCO, CALIFORNIA NOVEMBER 1948

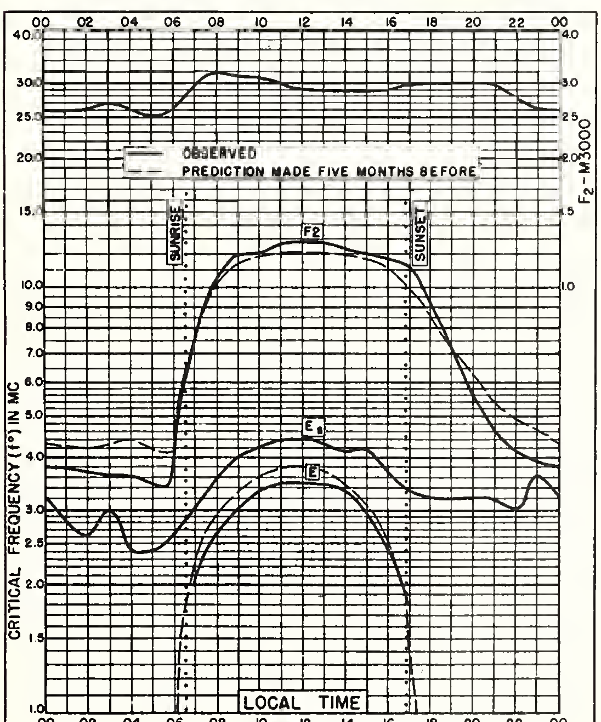


Fig. 7. WHITE SANDS, NEW MEXICO
32.3°N, 106.5°W NOVEMBER 1948

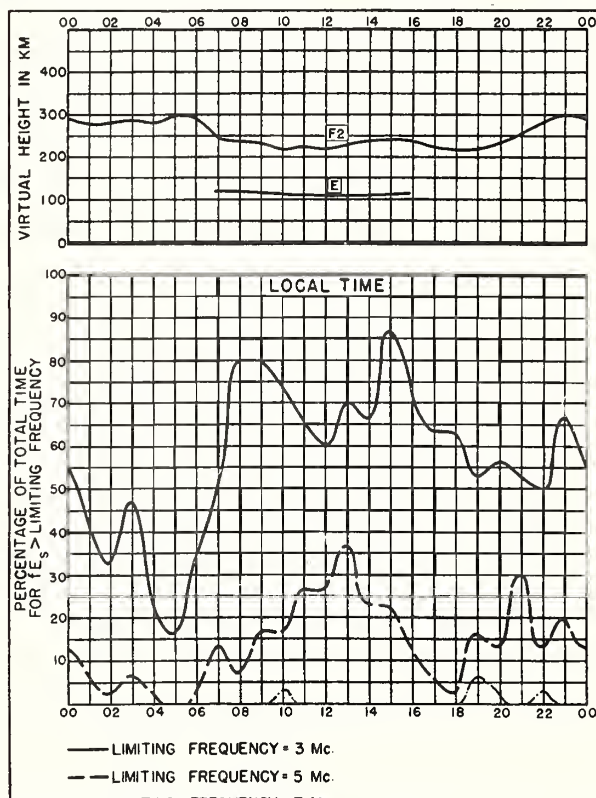


Fig. 8. WHITE SANDS, NEW MEXICO NOVEMBER 1948

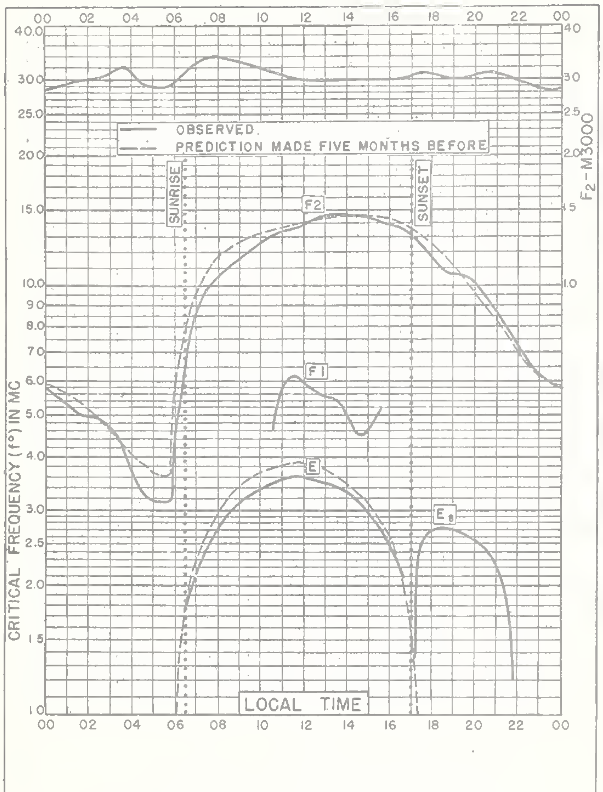


Fig. 9. WUCHANG, CHINA
30.6°N, 114.4°E NOVEMBER 1948

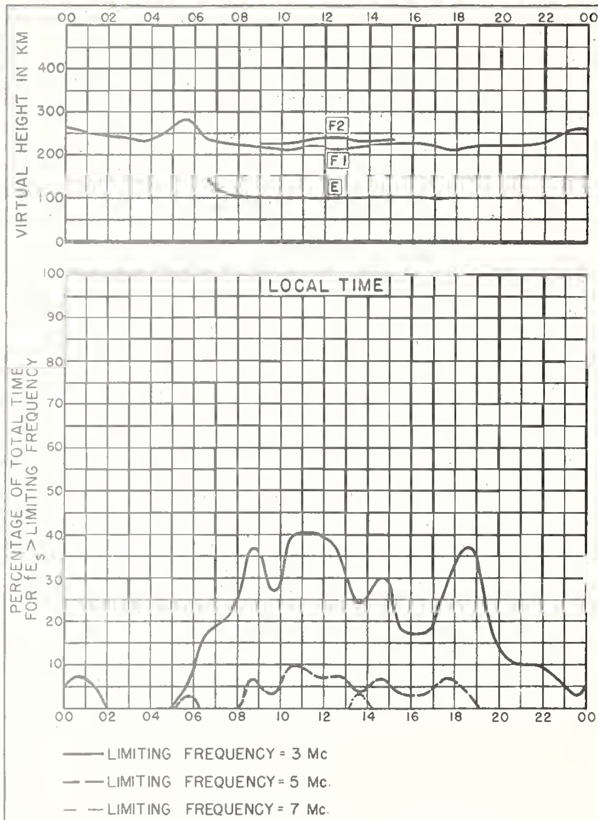


Fig. 10. WUCHANG, CHINA NOVEMBER 1948

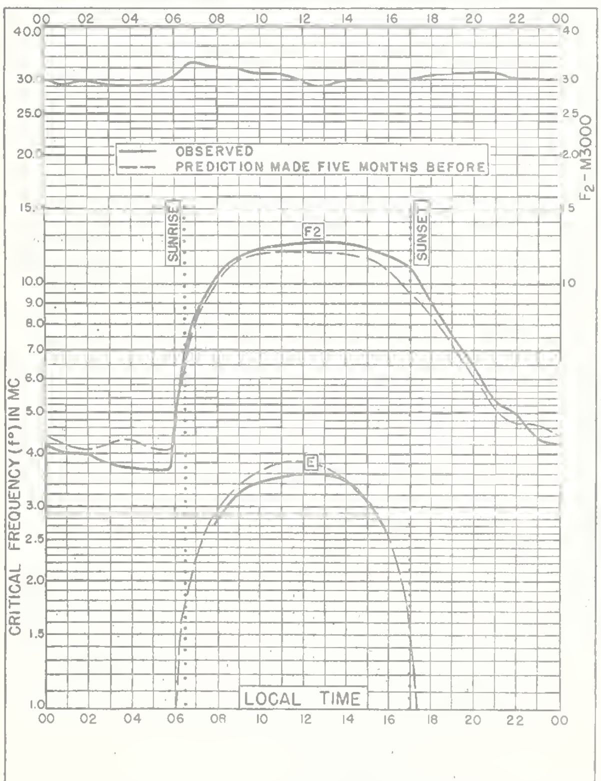


Fig. 11. BATON ROUGE, LOUISIANA
30.5°N, 91.2°W NOVEMBER 1948

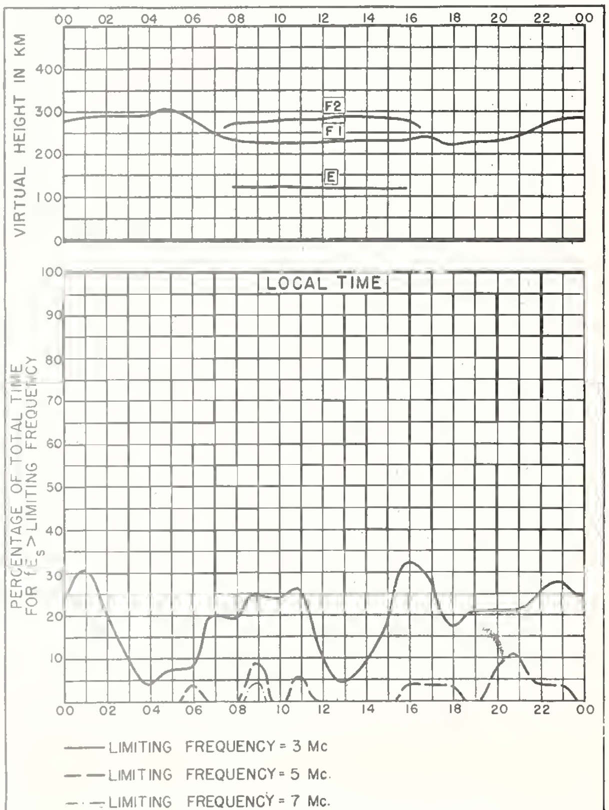


Fig. 12. BATON ROUGE, LOUISIANA NOVEMBER 1948

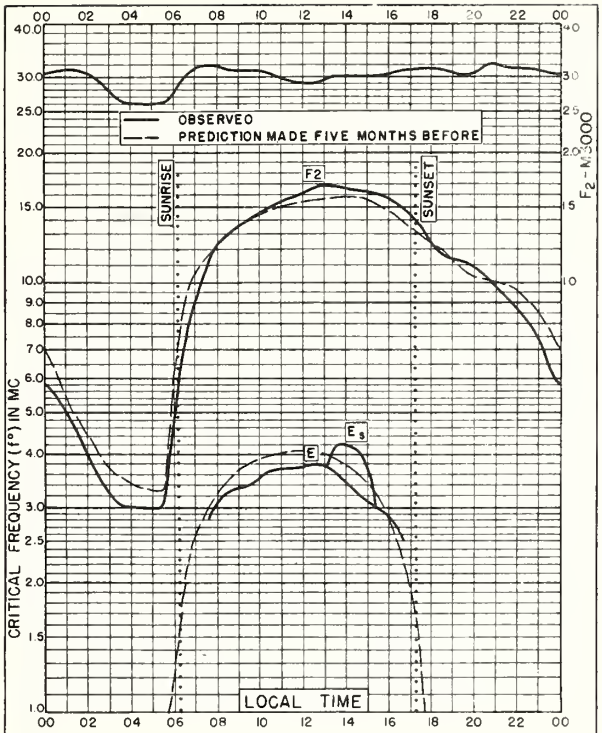


Fig. 13. MAUI, HAWAII
20.8°N, 156.5°W NOVEMBER 1948

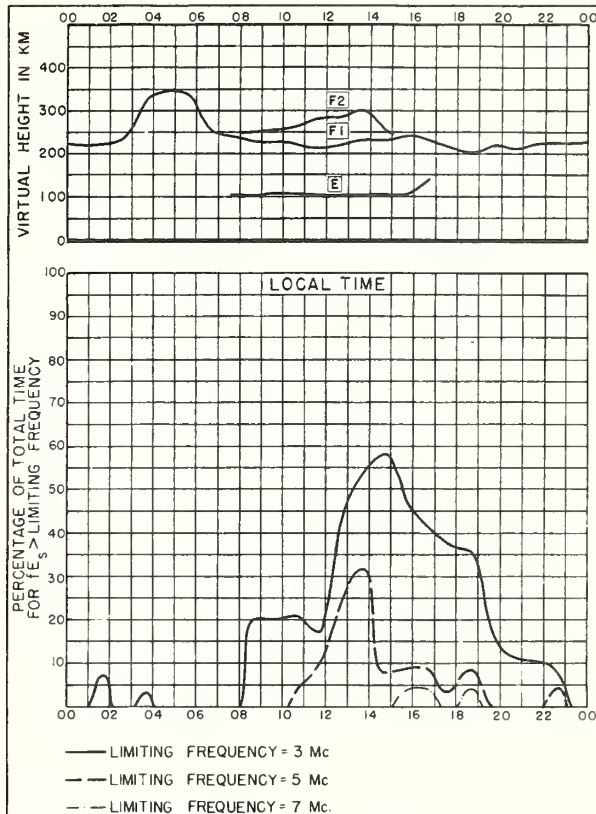


Fig. 14. MAUI, HAWAII NOVEMBER 1948

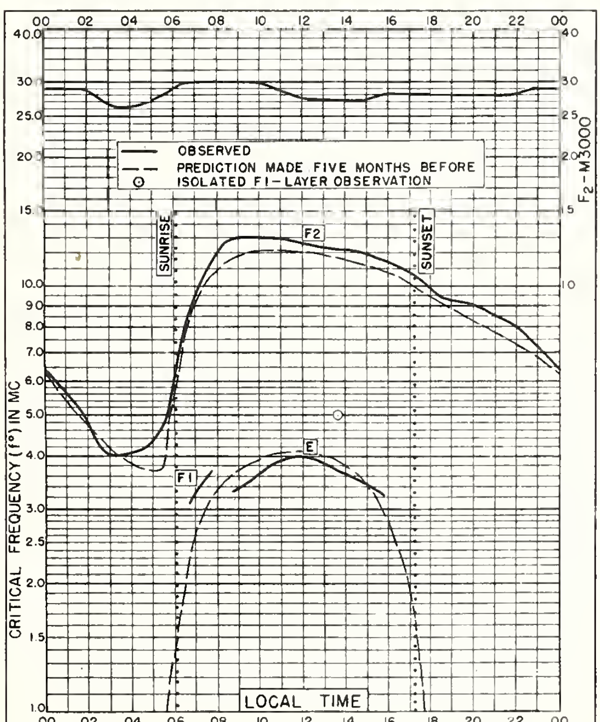


Fig. 15 SAN JUAN, PUERTO RICO
18.4°N, 66.1°W NOVEMBER 1948

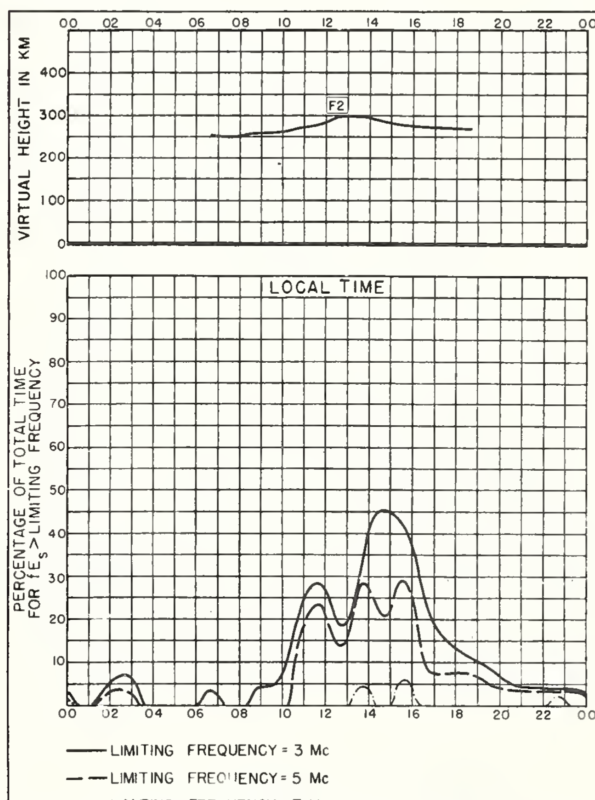
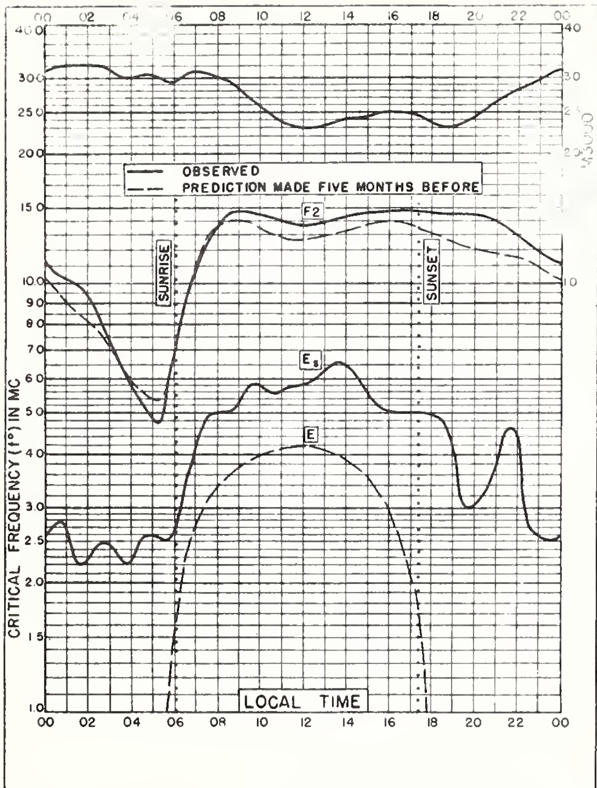


Fig. 16. SAN JUAN, PUERTO RICO NOVEMBER 1948



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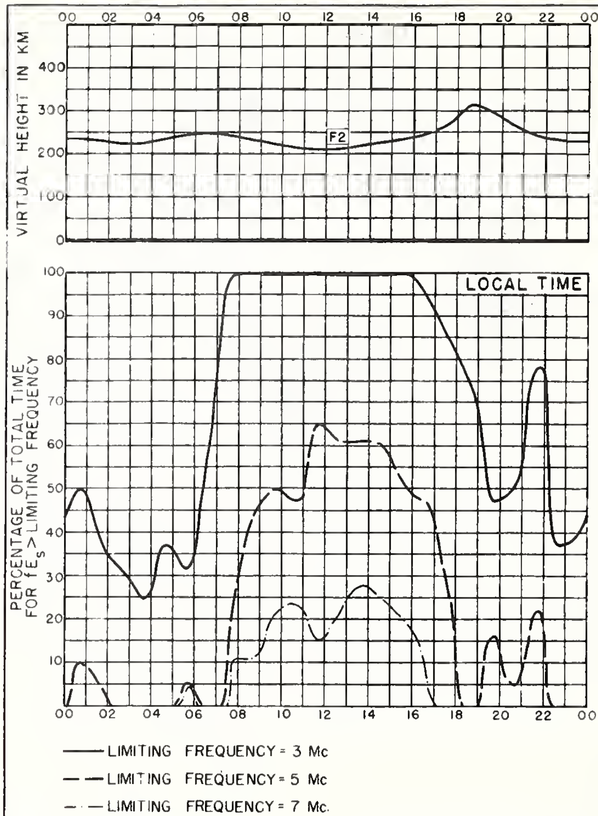

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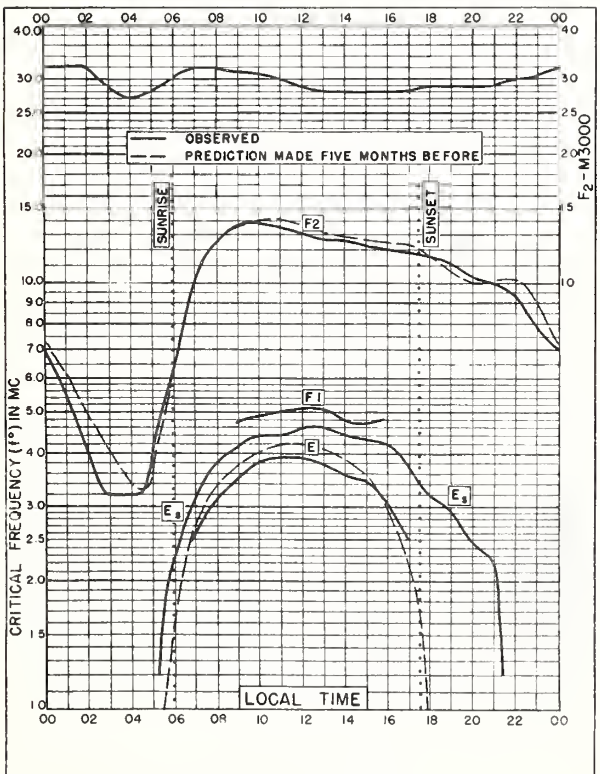

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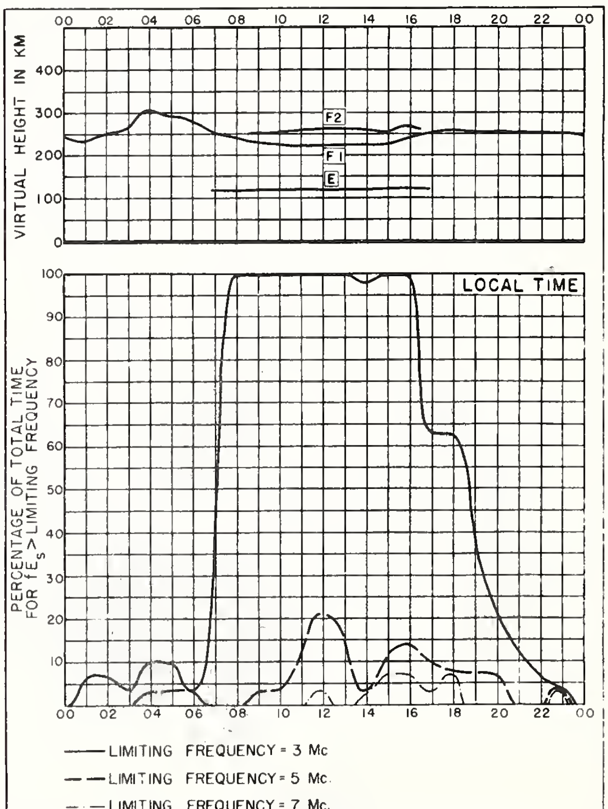

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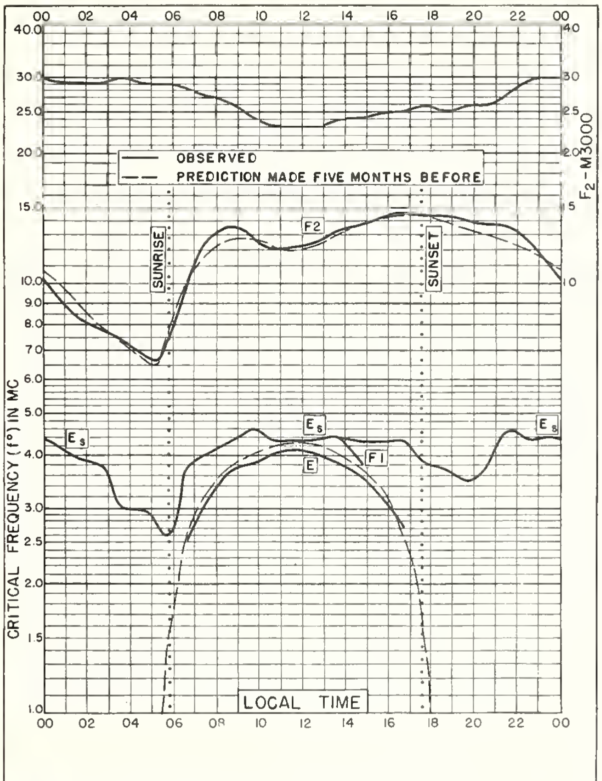

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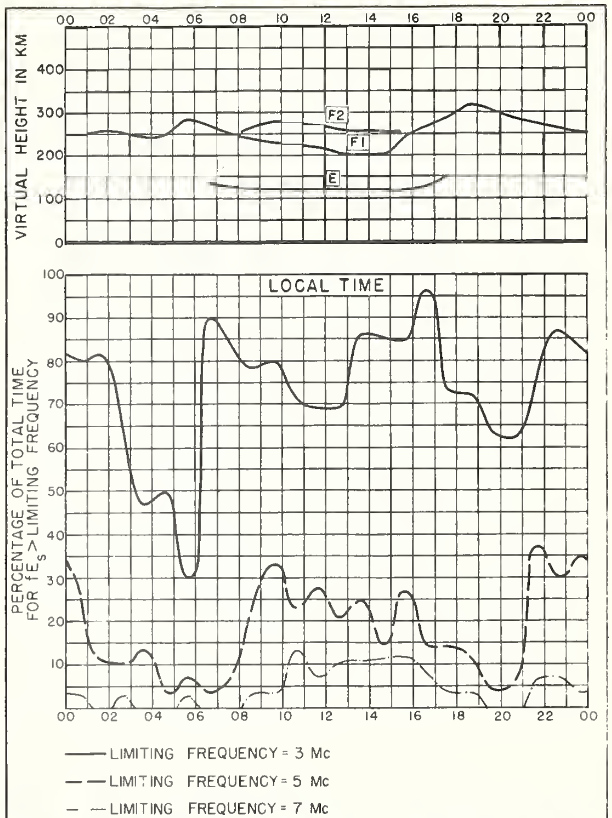

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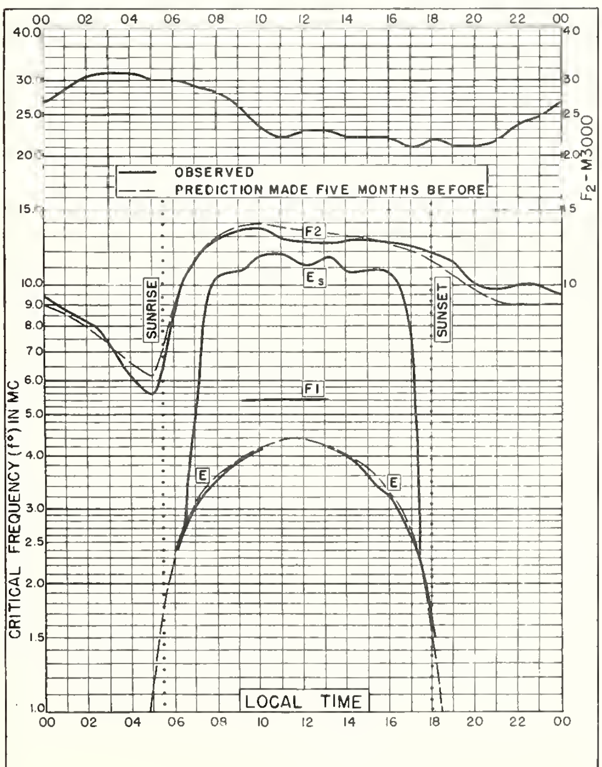

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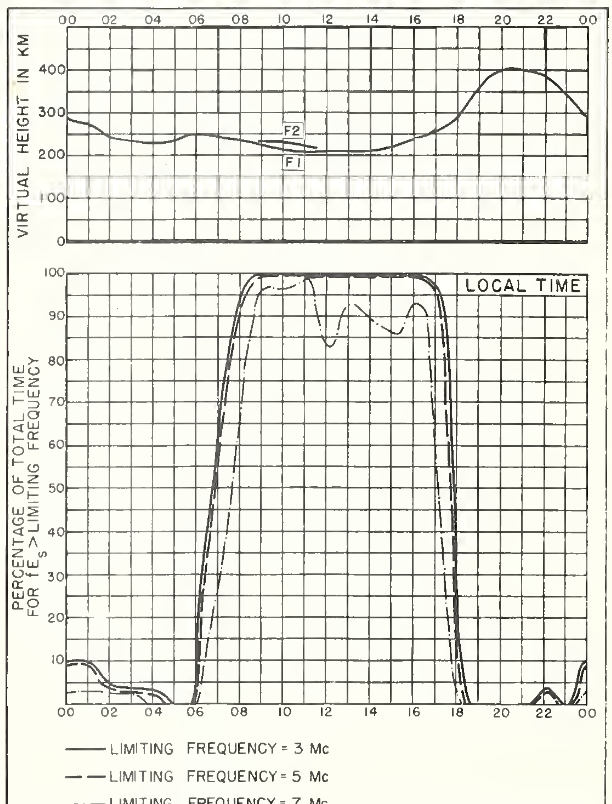

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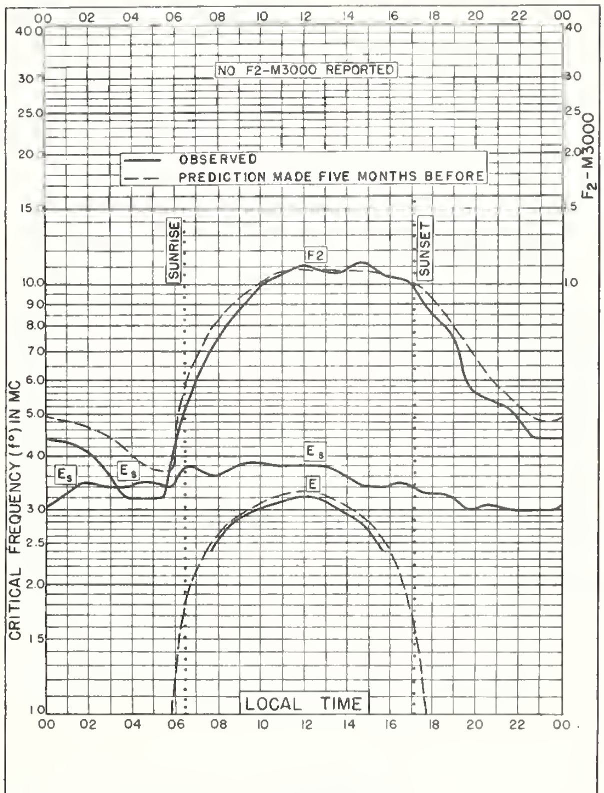

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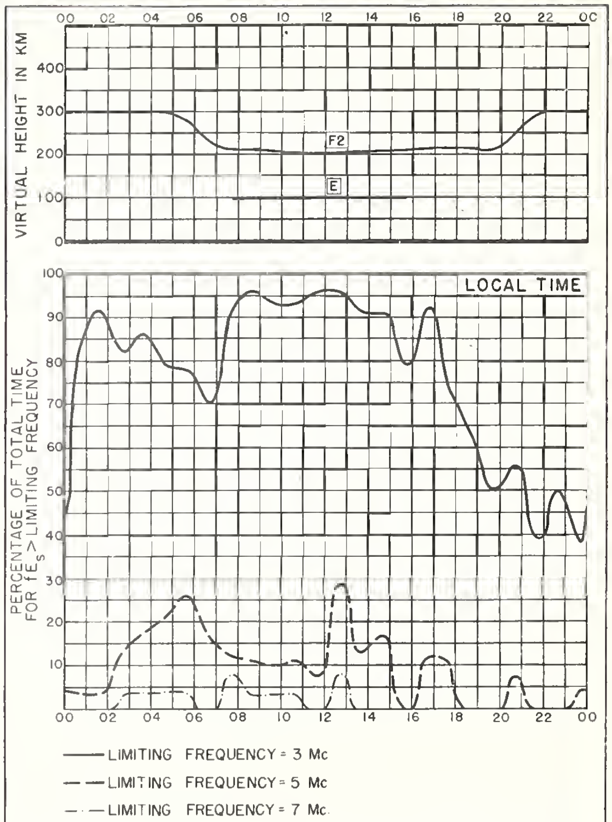

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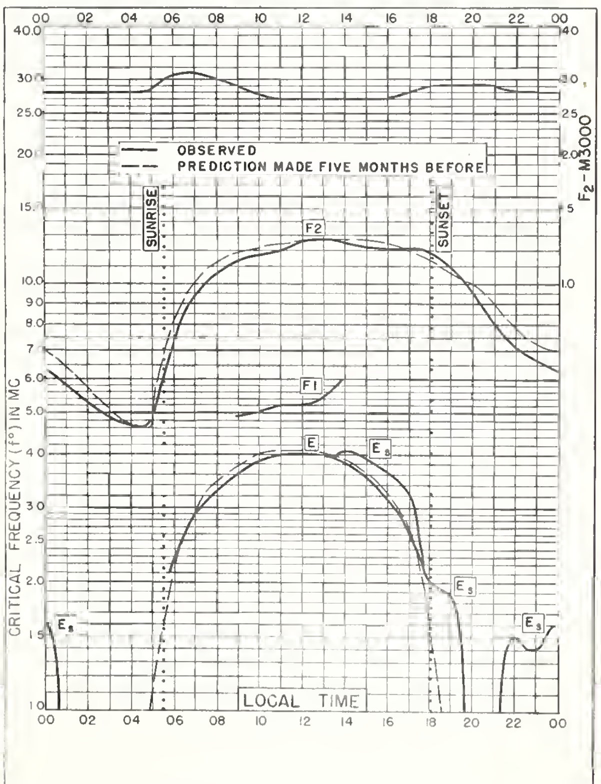

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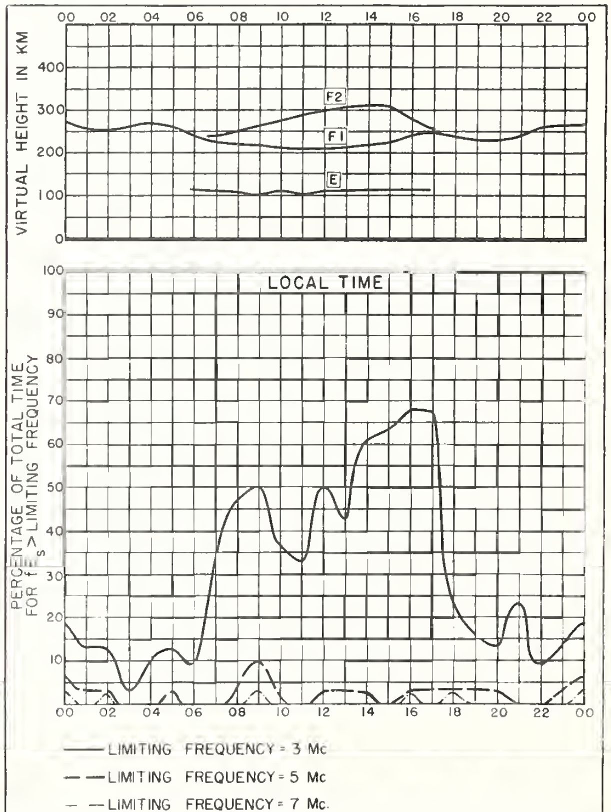

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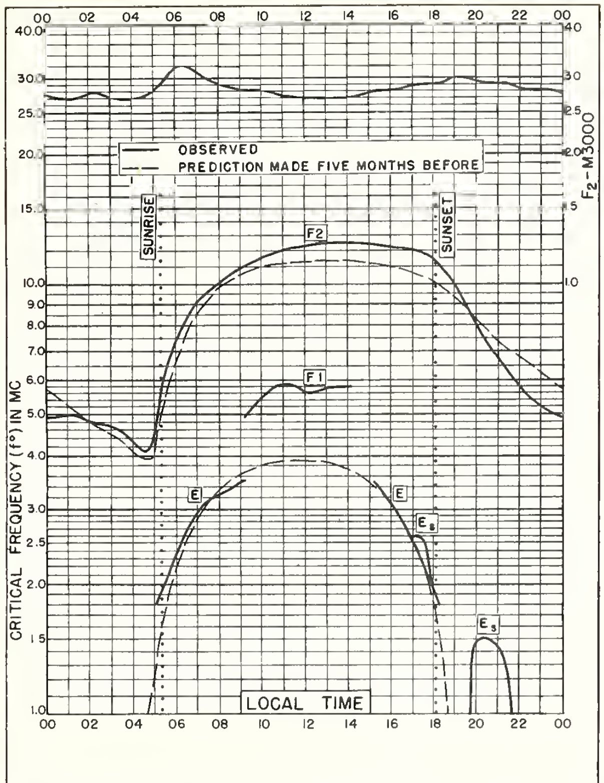

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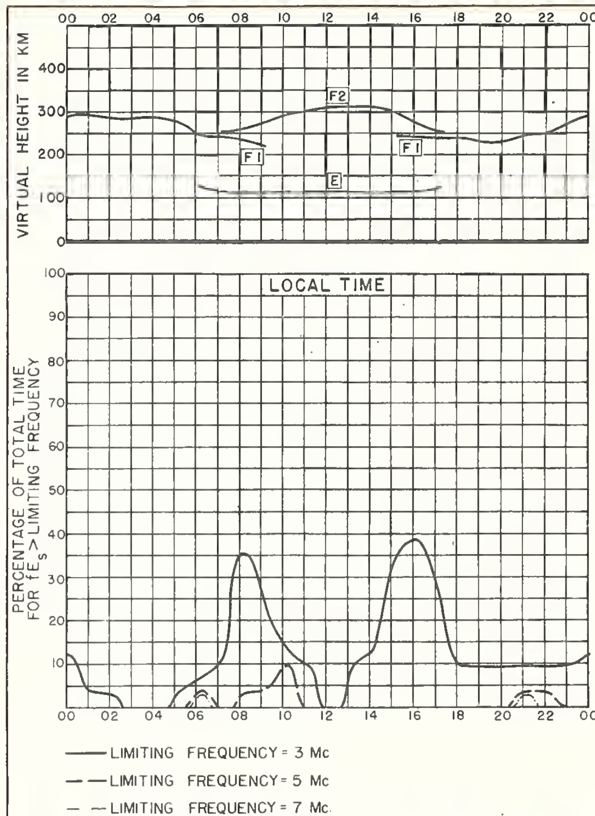

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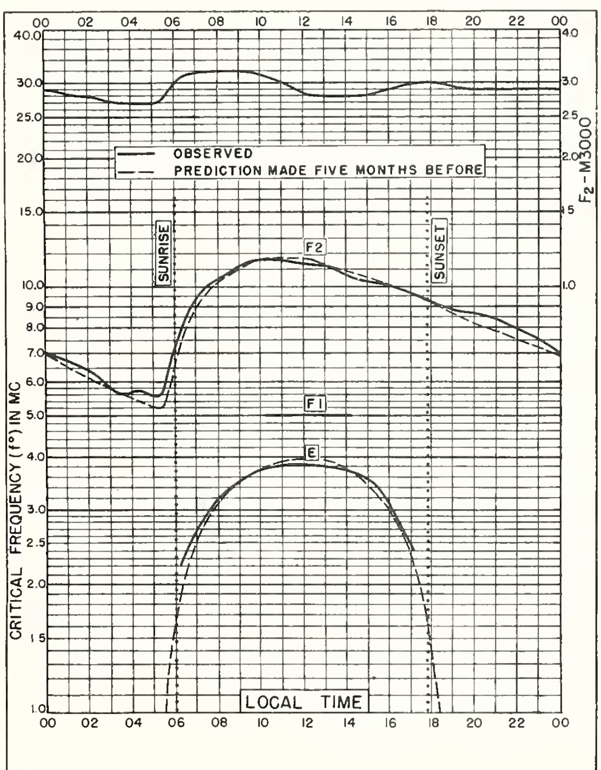

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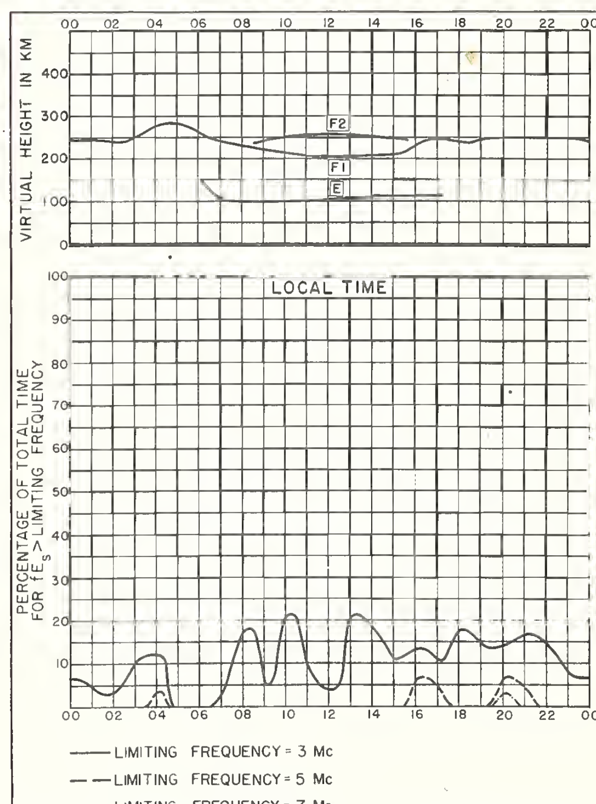

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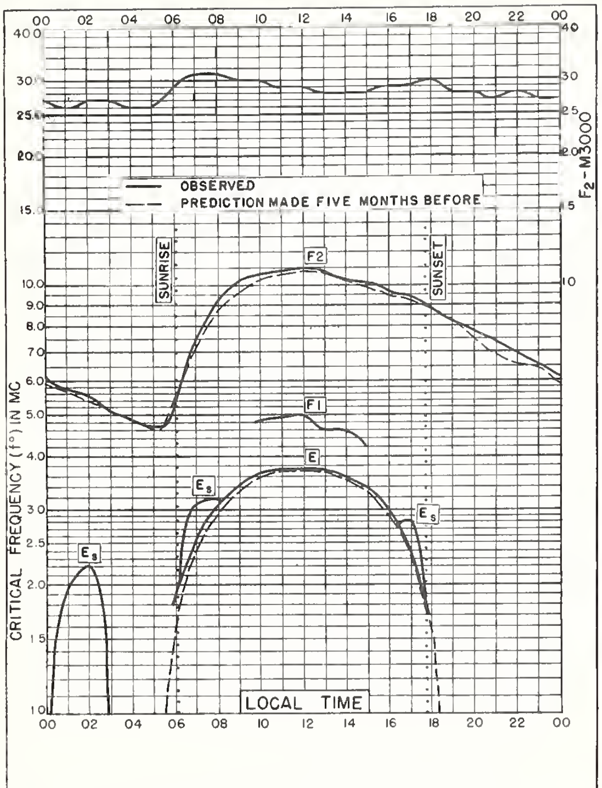

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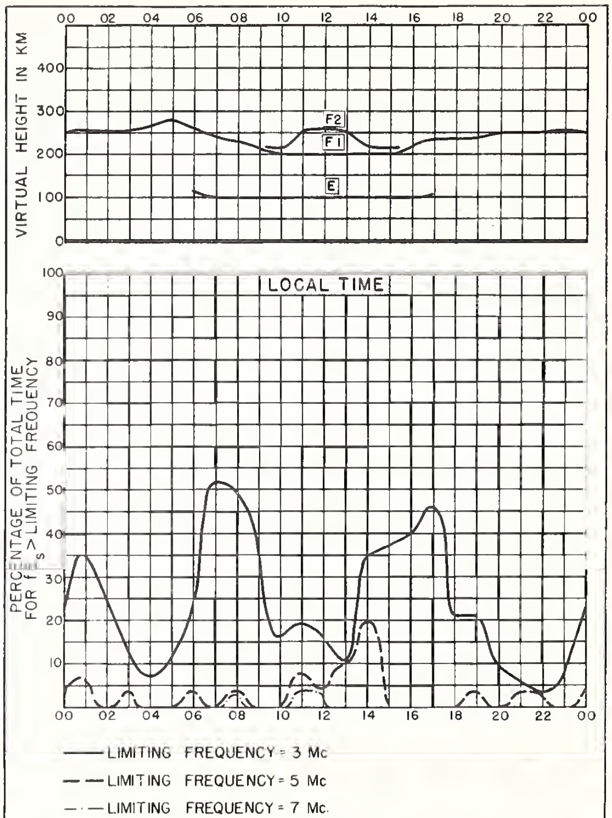

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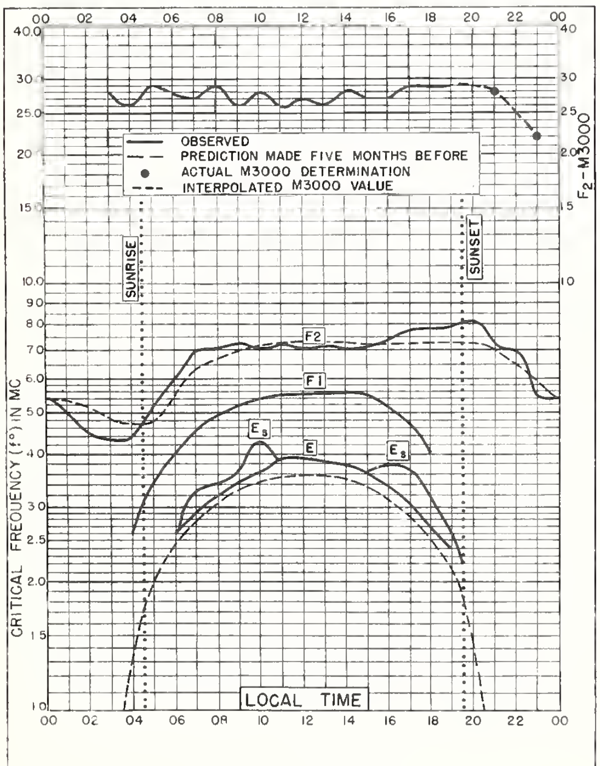

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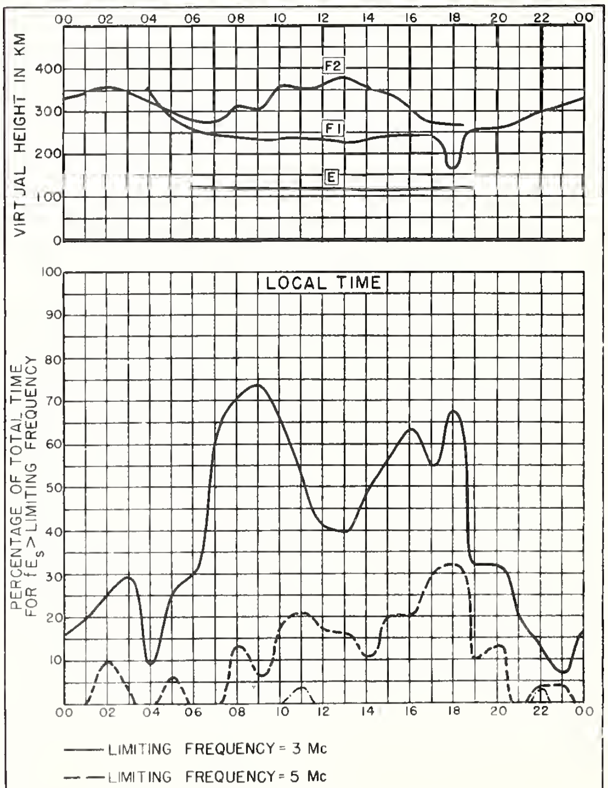

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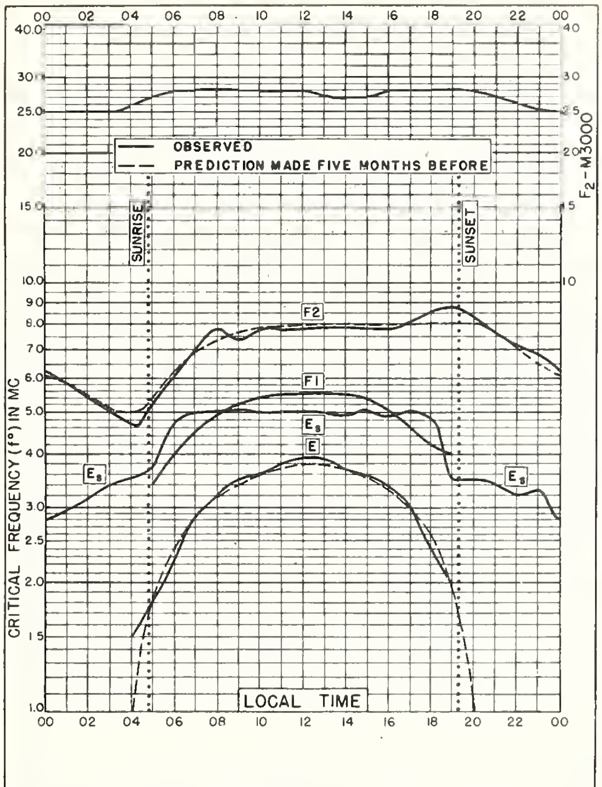

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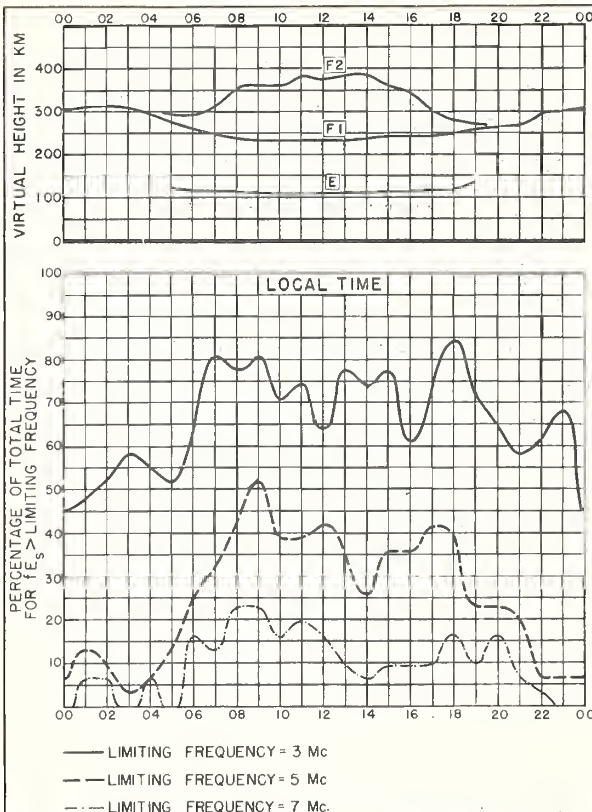

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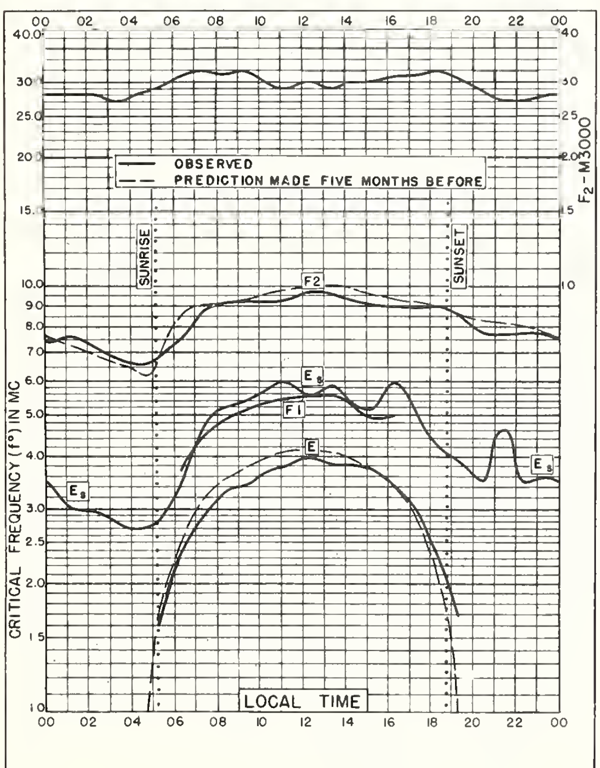

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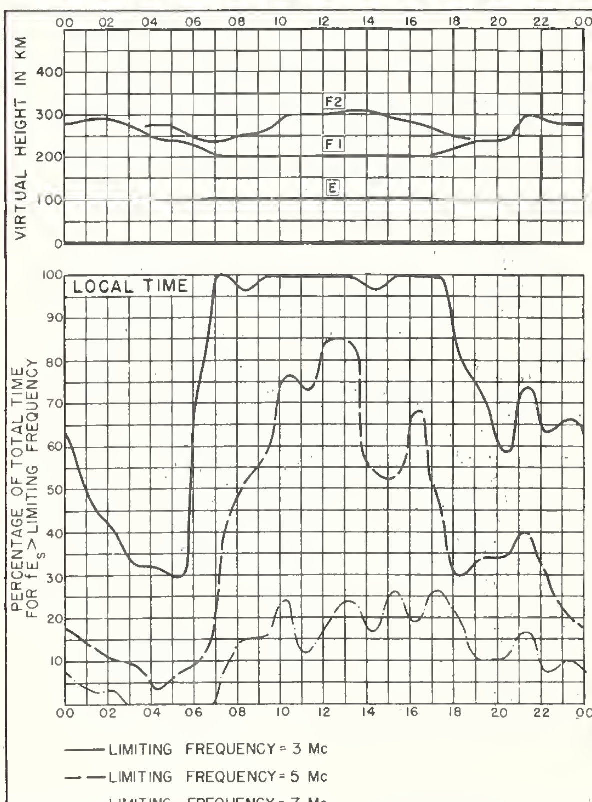

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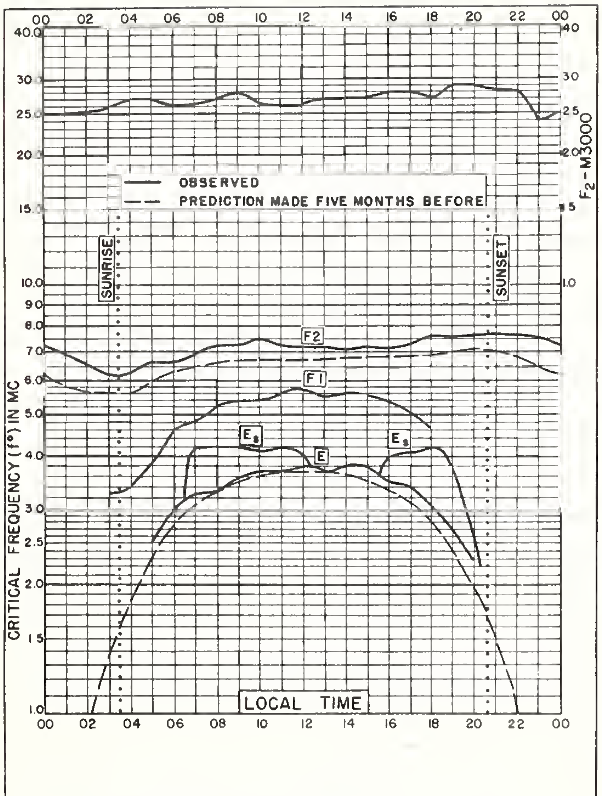

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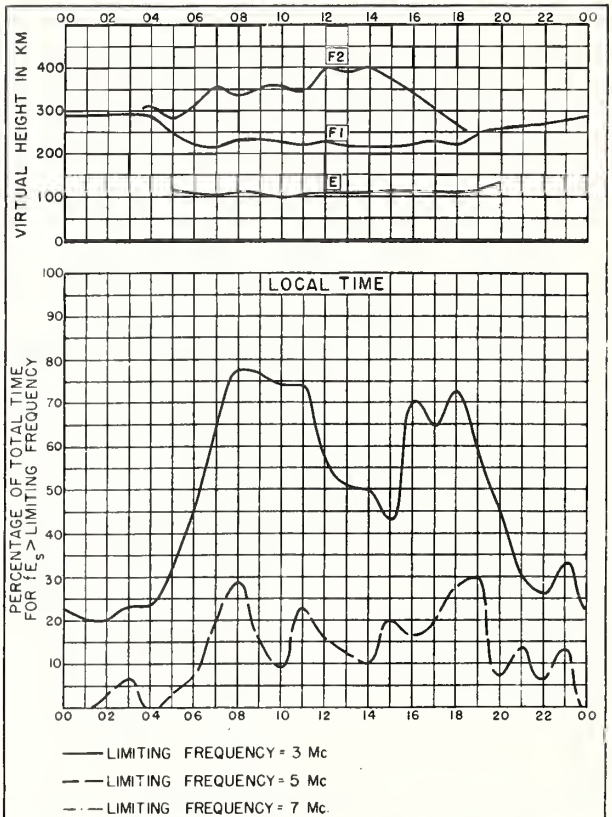

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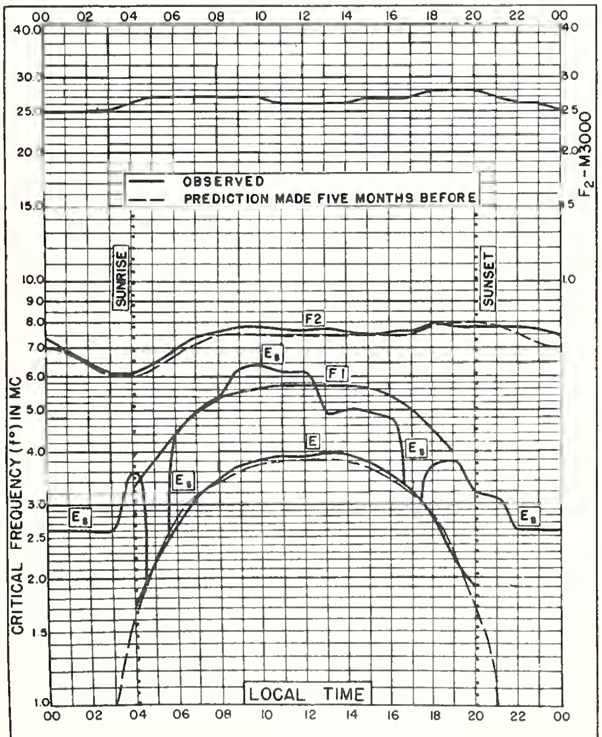

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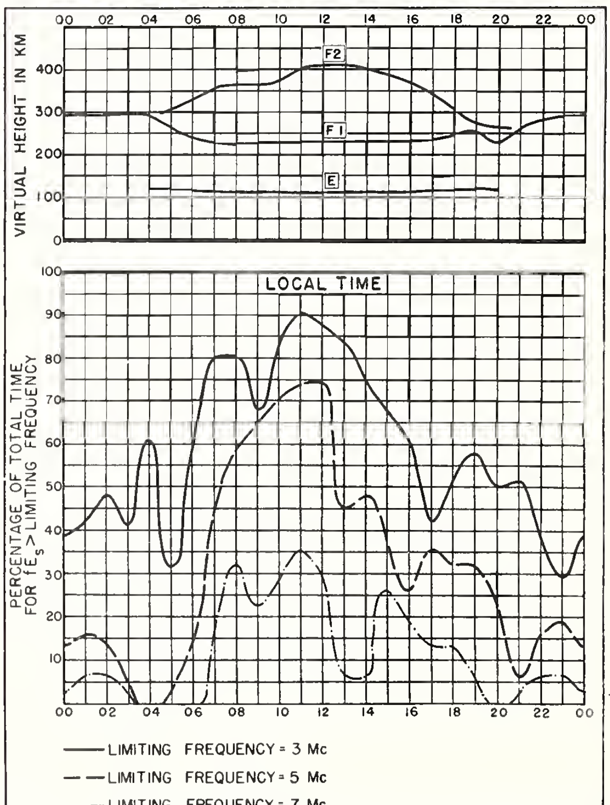

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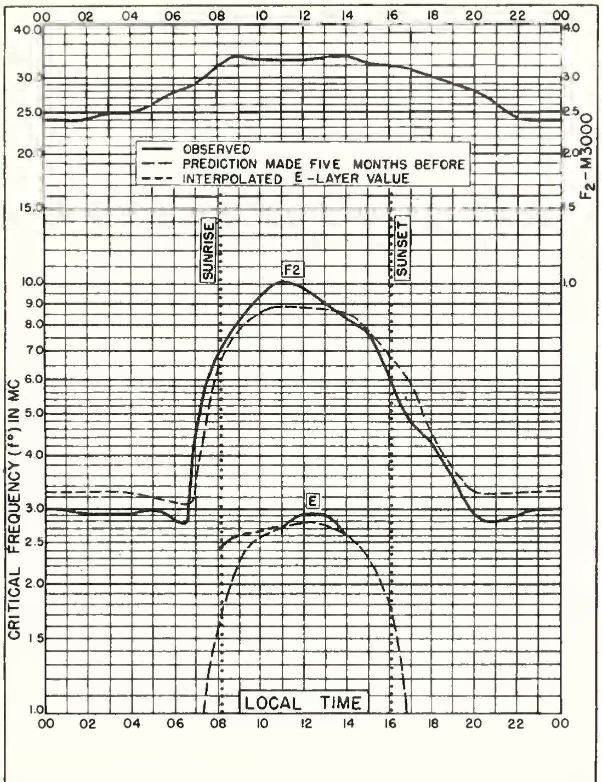

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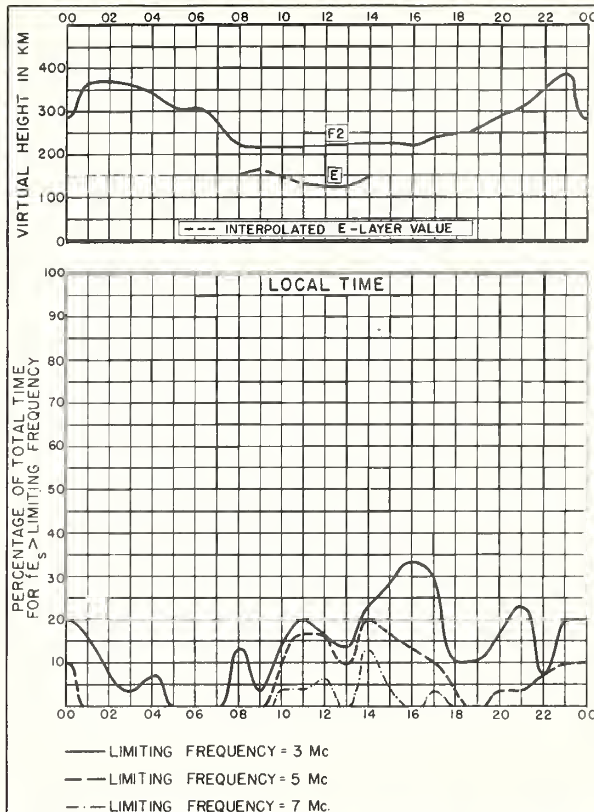

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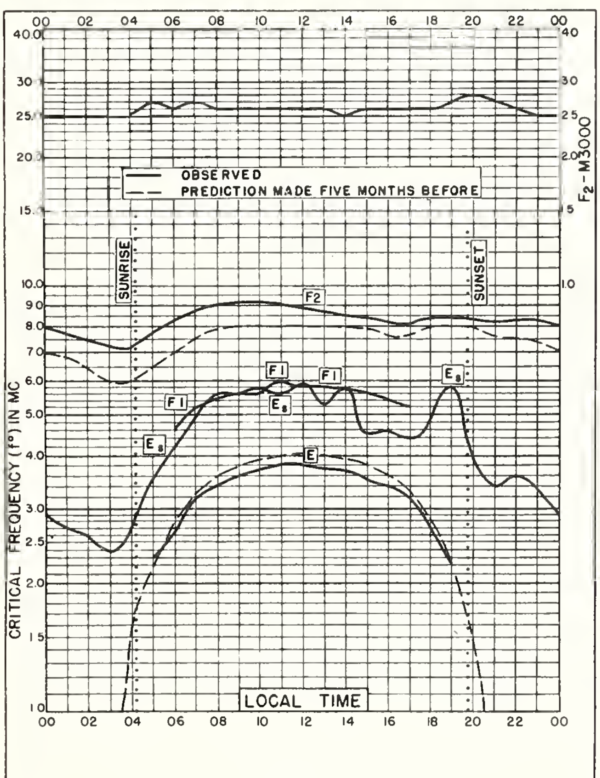

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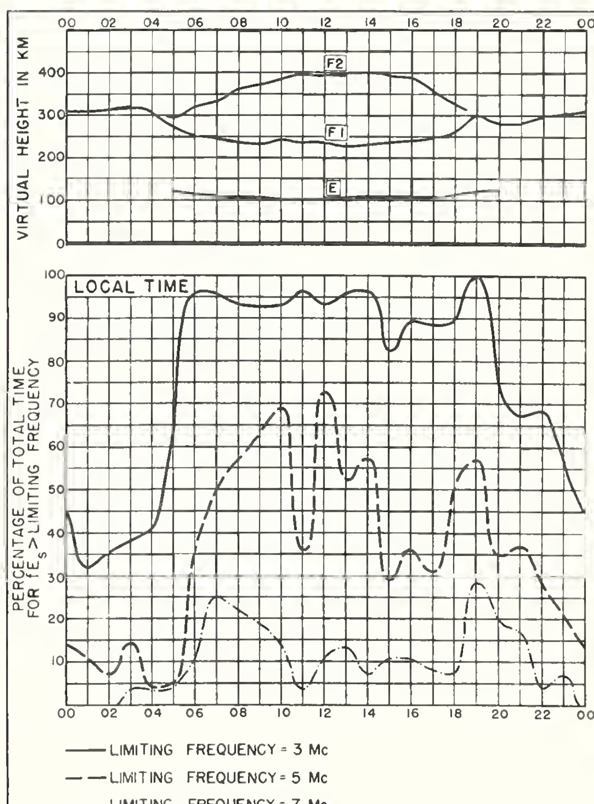

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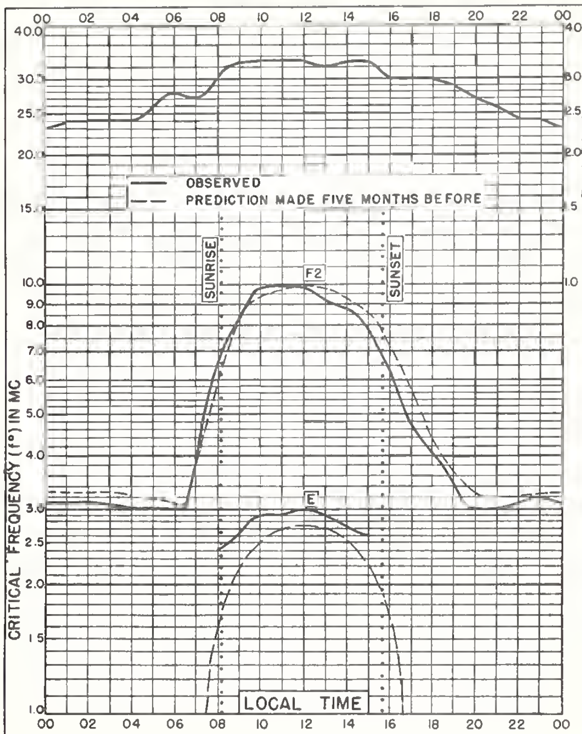

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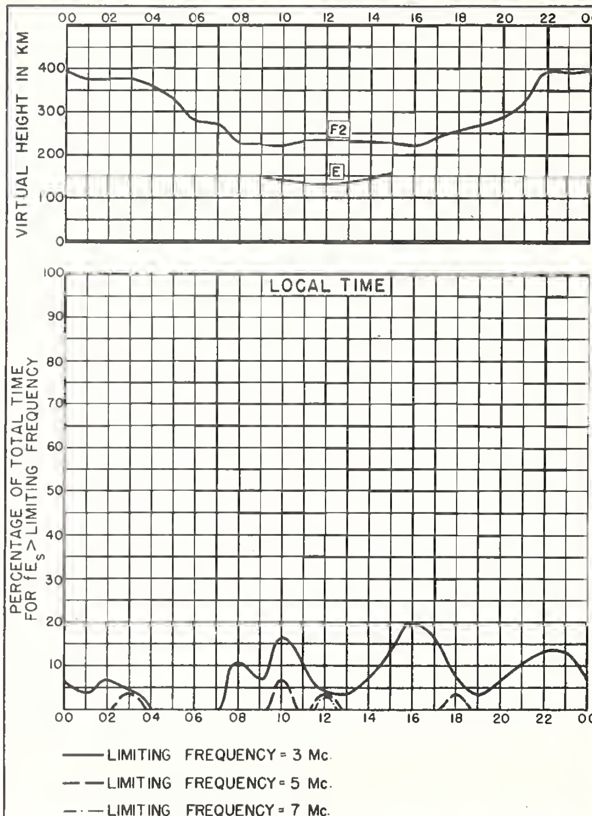

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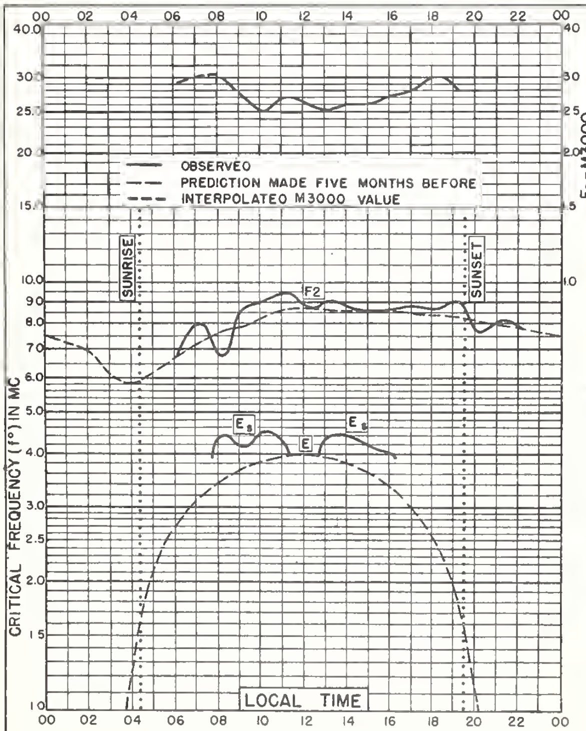

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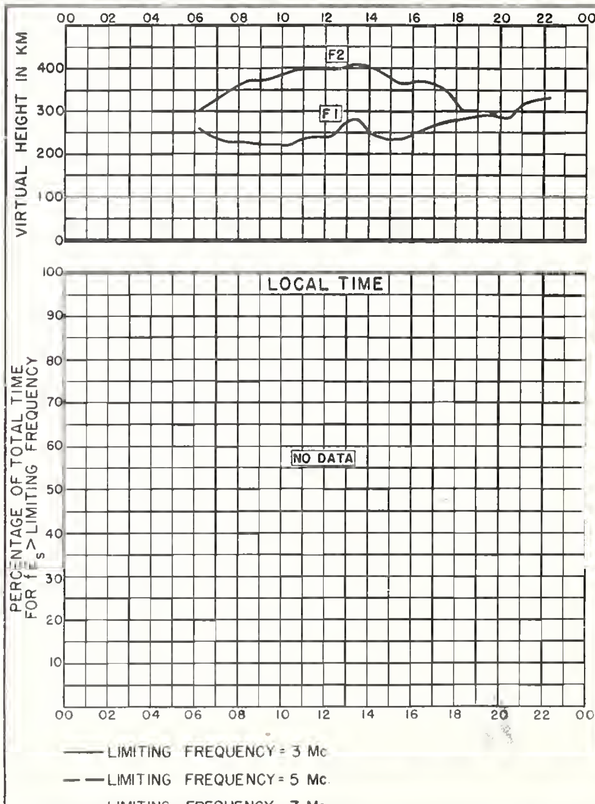

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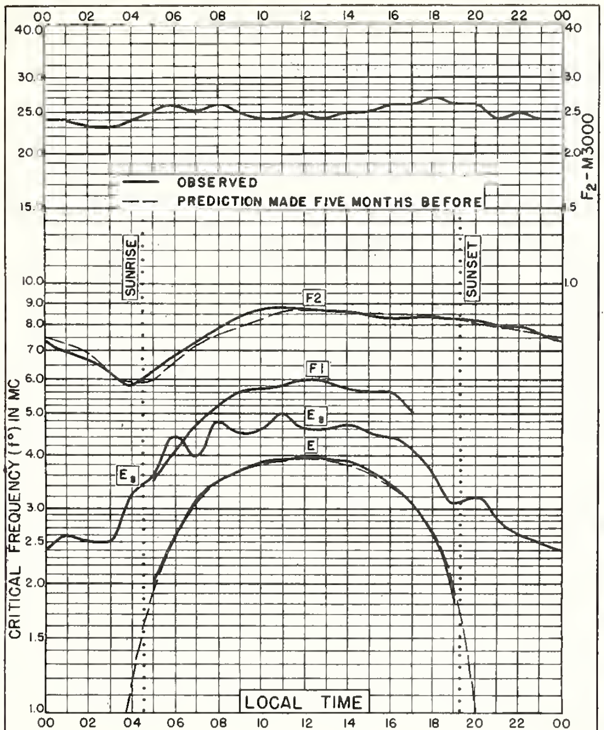

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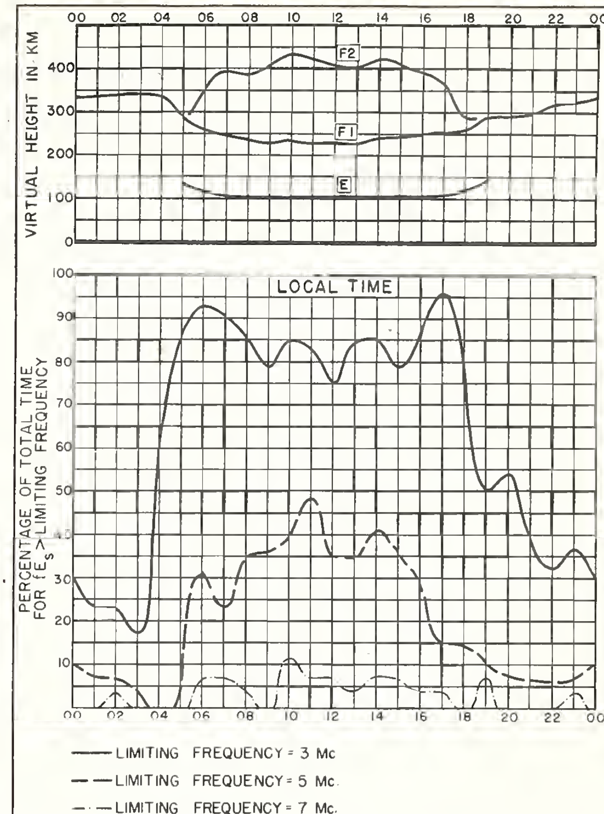

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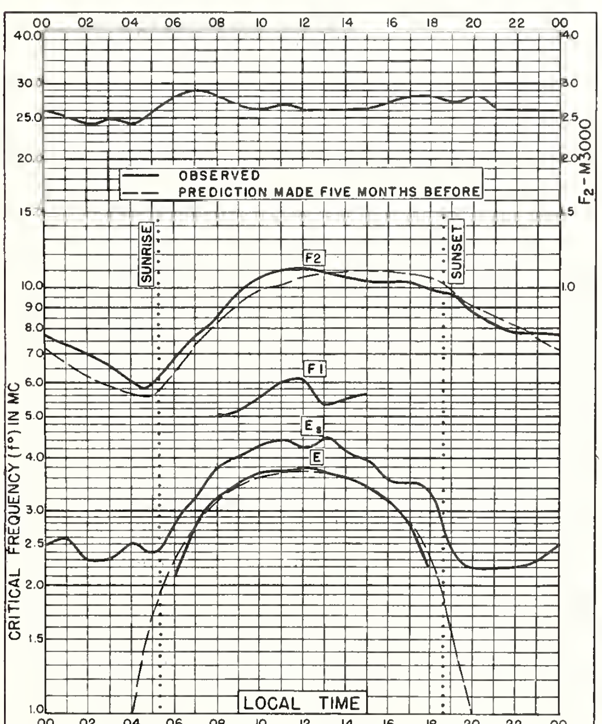

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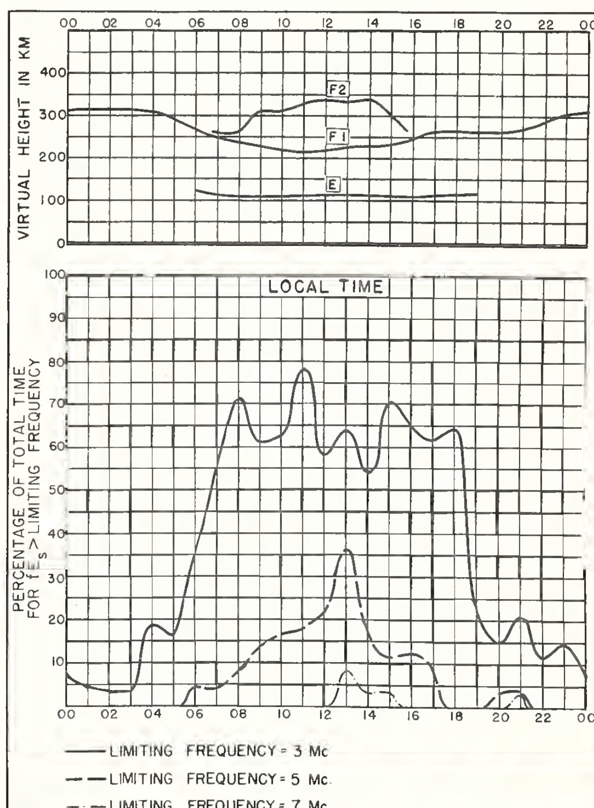

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